



* COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES

Post Office Box 2063 Harrisburg, Pennsylvania 17120



SEMS DocID

2343167

Bureau of Waste Management

Preliminary Assessment

FOR
ARCO Petroleum Products - Sludge Pond
PA #0781

City of Marcus Hook Delaware County Pennsylvania



Site History

Preliminary Assessment, PA-0781, is for a site located in Trainer Borough in the town of Marcus Hook, Delaware County, Pennsylvania. The site and surrounding area are presently owned by B.P. Oil, Inc. In years past, Sinclair Petroleum (the original builder of the refinery in 1922) and ARCO Petroleum Products owned and operated the site. B.P. Oil purchased the property from ARCO Petroleum Products in 1969.1

ARCO's 103(c) Notification, as required by CERCLA of 1980, identified the site as a landfill and an unknown facility which accepted 'unknown wastes from petroleum refining and related activities." ARCO identified the site's waste handling dates as 1925 to 1969.²

B.P. Oil's 103(c) Notification differs significantly from ARCO's Notification. B.P.'s Notification states:

"all hazardous waste in the Refinery's sludge lagoon (impoundment 60,000 square feet) was removed in 1975. All waste (5,000,000 gallons of API separator sludge) was chem-fixed and sent to the Kinsley Landfill in Deptford, New Jersey. An additional 66,000 gallons of hazardous waste are located in several small pits (8,100 square feet total). These pits contain leaded tank bottoms."

B.P. identified the wastes as RCRA classified KO51 and KO52 waste materials. B.P. identified the site's waste handling dates as 1949 to present (June 9, 1981).

Since telephone contacts with U.S. EPA personnel could not provide a site discovery form or additional information about the site, 4 the writer based/conducted PA-0781 on the following:

1. ARCO's 103(c) Notification

2. Interviews with B.P. Oil personnel

3. Telephone conversations with ARCO personnel⁵

Therefore, PA-0781 is about a sludge pond or basin which held KO51 (API separator sludge) waste material which was chem-fixed and the resulting material completely removed in 1975. PA-0781 will not address the KO52 waste material identified by B.P. Oil as being located in several small pits. The writer feels that since this material was discovered through a separate 103(c) Notification, it should be handled through a separate Preliminary Assessment.

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Present Site Conditions

At the present time, the former sludge pond is being used by B.P. Oil as an impoundment designed to contain contaminated runoff and overflows from B.P's API separator which may occur during heavy rainstorms.

The impoundment was permitted by the PA DER Bureau of Water Quality Management in 1976 and operates under permit number 2376202.

The impoundment is designed for a 10-year storm; 2 inches rainfall per hour for one hour. Impounded water is then returned to B.P.'s waste treatment facilities via pumping on a controlled basis.⁶

Emergency overflows from the impoundment discharge to Marcus Hook Creek which is located immediately west of the impoundment. The overflow pipe is designed such that any floating oil in the impoundment will not discharge to the creek.⁶

Prior to the initial operation of the impoundment under permit number 2376202, a slurry wall around the entire impoundment was emplaced to a gneiss 'bedrock''. I 6 Information about the slurry wall is contained in the exhibit portion of this Preliminary Assessment. The only problem the writer sees with B.P's slurry wall is that the wall was emplaced to the weathered bedrock zone and not competent bedrock. This may result in the migration of contaminants through the weathered bedrock zone, i.e., beneath the slurry wall.

Beneath the base of the impoundment, B.P. installed an underdrain system which conveys groundwater away from the base of the impoundment. Groundwater collected by this system is discharged to Marcus Hook Creek.

A telephone conversation with B.P. personnel indicate that no known liner system, clay or synthetic, was emplaced over the base of the impoundment. It is believed that only a soil base was emplaced above the natural soil/bedrock. B.P. personnel, however, indicate that soil borings taken from the impoundment reveal a clay-type soil. It is uncertain whether this soil was "accidentally" emplaced or is naturally occurring.

Clean-up Procedures/Actions

The following several pages, taken from Exhibit C-2.0,-2.12 detail the phases of clean-up and elimination of the sludge pond.

In short, chem-fixing is a chemical process where hydrocarbons become trapped in a lattice of strongly bonded chemicals. The resulting material does not leach hydrocarbons in rainwater.

PLAN OF OPERATION SLUDGE LAGOON ELIMINATION BP OIL, INCORPORATED MARCUS HOOK REFINERY

Phase I

Elected subcontractor to supply men and equipment to remove debris and obstructions from lagoon to facilitate Chemfix processing. Lagoon dikes on plant north and west do not have sufficient load bearing strength to support equipment. To circumvent any possibility of accidental breakage or spills, a system has been devised to avoid any contact with dikes. Debris consisting of a broken concrete ramp, some construction trash, and possibly sunken obstacles not detected by core probings, will be draglined to the stable south bank. A clamshell will remove the collected debris to sealed truck containers for haulage to landfill. Each truckload will be registered on the appropriate regulatory agency form and receipt will be documented by the permitted landfill. Disposal will be at KinBuc landfill in Edison, New Jersey, which is owned and operated by Eastern Industrial Incorporated.

Phase II

To be accomplished in conjunction with or shortly after

Phase I. The parking lot area due west of the lagoon will be

excavated to form a series of dikes to contain the Chemfix solids

for curing. On both the lagoon and disposal area sides, diking

will be arranged to collect any natural or liquid runoff in order

that it may be diverted to the refinery oily waste sewer system.

Page 2

Plan of Operation - Sludge Lagoon Elimination, cont'd

All piping adjacent to or overspanning the creek will be double walled. Should accidental breakage occur, the discharge will flow back to the lagoon or to the water collection dike.

Phase III

During or following Phase II, two (2) Chemfix mobile process vans with supporting equipment will be positioned as shown on the site plot plan. Once the lagoon has been thoroughly agitated to provide a homogeneous slurry, Chemfix processing will begin. Chemfix on-site personnel will include a Technical Service Representative for the job duration to analyze both the raw waste and Chemfix end product. Complete analytical control will be maintained. Samples of the end product will be forwarded to our laboratory or BP's laboratory for confirming analyses. Also full time will be our Project Engineer who, in conjunction with BP's designated engineer, will supervise both the subcontractors' and our personnel. These safeguards against both technical or mechanical liabilities will ensure performance to the State's satisfaction.

Phase IV

At BP's request, the dike walls containing the end product will be limited in height to avoid any possibility of spills. An average of two feet of freeboard will be maintained. This specification prohabits the entire processing of the lagoon at



Plan of Operation - Sludge Lagoon Elimination, cont'd Page 3

one time due to disposal area volume limitations. Chemfix will process until the disposal area is full, stop until the contractor removes the Chemfix solids, and then proceed to fill the disposal area again. This sequence will continue until all pumpable material has been removed from the lagoon. Subcontractor(s) will be instructed to fill out the same forms to register truckloads and confirm receipt at landfill. It is expected that Chemfix solids will remain in the disposal area for a maximum of about 12-15 days before each haul-off sequence. Disposal of the Chemfixed material will be at Kinsley Landfill in Depthford, New Jersey, which is owned and operated by Eastern Industrial Incorporated.

Phase V

Upon completion of Phase IV, that material that was not pumpable, consisting mainly of oil-soaked soil, the top three inches of lagoon bottom silt, will be loaded out and hauled to landfill using the same precautions as covered in Phase I above. This material will be disposed at KinBuc Landfill in Edison, New Jersey, which is owned and operated by Eastern Industrial Incorporated.

Nature of Hazardous Materials

As previously stated, KO51 (API separator sludge) waste material was disposed of at the sludge pond site. This is the only known material to have been disposed. KO51 waste material is considered hazardous on the basis of its toxicity.

Routes for Contamination

In the writer's opinion, there are two (2) routes for contamination at the site; subsurface (groundwater) and surface water contamination. Of the two, groundwater contamination is considered to be the more significant.

Air contamination was not considered to be a contamination route due to the physical nature of the waste - an oily sludge.

Off-site soil contamination could possibly occur, but since B.P. Oil owns the surrounding land (the refinery encompasses the impoundment) it is felt that this is an insignificant contamination route and poses no threat.

The former sludge pond and present day waste water impoundment is monitored by four (4) groundwater monitoring wells. Three (3) of the monitoring wells are located outside the previously mentioned slurry wall, while one well (well no. 2) is located inside the slurry wall. Monitoring wells nos. 3 and 4 are identified as being background wells, while monitoring well no. 1 is identified as being downgradient. 1 8

Review of groundwater data obtained from the on-site monitoring wells reveal:

- 'marked downgradient increases in C.O.D., ammonia nitrogen, and alkalinity. Iron and manganese are also elevated in downgradient wells.
- 2. Increases in alkalinity and ammonia would tend to indicate biodegradation of organics when viewed in conjunction with the elevated C.O.D. value this would suggest current or past contamination by hydrocarbons."9

Potentially Affected Population and Resources

Since	the	nearest	well	to	the	site	has	been	reporte	d a	s being	(b) (9)		
			, no	in c	mact	on	surro	oundir	ng wells	is	expect	e d.		Π

The local water authority for the Marcus Hook area is the Chester Water Authority. The Water Authority's supply source is (b)(9)

from the site area, and therefore, no impact is expected on the supply source from the site.

Potentially affected resources around the site area are Marcus Hook Creek and the Delaware River. Assuming one could measure a contaminant release to these waters, only very minor release, if any, would be expected - the hazardous materials were all removed in 1975. Any contamination or degradation that is presently showing up in the monitoring wells is, in the writer's opinion, coming from present day activities and not past activities.

Conclusion/Justification

It is recommended that the ARCO Petroleum Products sludge pond (presently known as the B.P. Oil wastewater impoundment) be inspected on a time available basis - a low level priority assessment is recommended. Reasons for this are:

- 1. all hazardous wastes held in the sludge pond have been removed
- 2. the installation of a slurry wall around the entire sludge pond
- 3. installation of a groundwater monitoring program with reports submitted to the PA DER Bureau of Water Quality Management for review
- 4. no impact on the local water supply, and
- 5. minor impact, if the impact could be detected/determined, on Marcus Hook Creek and the Delaware River from the former operations of the sludge pond.

REFERENCES

- 1. Site visit/interview with Charles Barksdale, B.P. Oil, Environmental Engineer; 6/8/87.
- 2. Notification of Hazardous Waste Site Form; EPA Form 8900-1; ARCO Petroleum Products; 6/8/81, Exhibit B- 1.0-1.7.
- 3. Notification of Hazardous Waste Site Form; EPA form 8900-1; B.P. Oil, Inc.; 6/9/81; Exhibit B- 2.0-2.1.
- 4. Telephone conversation with Paul Racette; EPA; 6/10/87.
- 5. Telephone conversations with Rosanne Stevenson; ARCO Petroleum Products, Anaheim, California.
- 6. Application for Water Quality Management Permit, B.P. Oil, Inc.; Prepared 6/30/76; Exhibit C- 1.0-1.50.
- 7. Application for Permit for Solid Waste Disposal and/or Processing Facilities; B.P. Oil, Inc., Notarized 7/18/75; Exhibit C- 2.0-2.12.
- 8. Module 5A-Phase II Ground Water Quality Monitoring Information; B.P. Oil, Inc.; Prepared 4/29/77; Exhibit C- 3.0-3.3.
- 9. Memo from Paul Yaniga, Geologist, to John Kennedy, Sanitary Engineer; 6/21/77; Exhibit D- 1.0.

SEPA	ı	NTIAL HAZAR PRELIMINARY SITE INFORMA	ASSES	SMENT			I. IDENTIF	CATION 2 SITE NUMBER 0781	
II. SITE NAME AND LOCATION									
01 SITE NAME (Legal, common, or descriptive name	of site)		02 STREE	T, ROUTE NO., O	R SPEC	CIFIC LOCATION	IDENTIFIER		
ARCO Petroleum Produ	ıcts - Slude	e Pond	Pos	t Road					
O3 CITY					06 CC	DUNTY		07 COUNT CODE	Y 08 CONG
Marcus Hook			PA	19061]	Delaware	<u> </u>		
09 COORDINATES LATITUDE 390 49' 00'' N	LONG 075 ⁰ 24	1 30". W		· · · · · · · · · · · · · · · · · · ·					
10 DIRECTIONS TO SITE (Starting from nearest put			L						
Proceed into the town within.	vn of Marcus	Hook, PA	– Ent	er B.P.	0i1	Company	and ir	nquire	
III. RESPONSIBLE PARTIES									
01 OWNER (# known)			02 STREE	T (Business mailing	resident	tial)			
B.P. 0i1, Inc.				0. Box 4	28				
03 CITY			04 STATE	05 ZIP CODE	1	06 TELEPHONE			
Marcus, Hook			PA	19061	、 J	(215) 499	7000		
07 OPERATOR (If known and different from owner)			08 STREE	T (Business mailing,	resident	tiel)			
ARCO Petroleum Produ	icts Company	,	1990 Cresent Avenue						
09 CITY				11 ZIP CODE		12 TELEPHONE (714) 491			
Aneheim			CA	92801		(114) 49		<u> </u>	
13 TYPE OF OWNERSHIP (Check one) A. PRIVATE B. FEI	DERAL:	(Agency name)	· -	_ □ C. STA		□D.COUNTY	E. MU	NICIPAL	
1	(Specify)	5 6.1 7						. D d	
14 OWNER/OPERATOR NOTIFICATION ON FI	8 / 18/ 80 MONTH DAY YEAR	D. UIL, IN	.C • ED WAST	E SITE (CERCLA 1	03 c)	DATE RECEIV	ED: 6 / 8	B / 81	C. NONE
IV. CHARACTERIZATION OF POTE									
01 ON SITE INSPECTION KYES DATE 6 / 8 / 8 □ NO MONTH DAY YE		ell that apply) PA B. EPA DCAL HEALTH OFFI					D. OTHER	CONTRACTO	R -
		ACTOR NAME(S): _							
02 SITE STATUS (Check one) Refiners	active C. UNKNOWN	03 YEARS OF OPERA	ATION 1925 EGINNING YE		69		□ UNKNOW!	N	
04 DESCRIPTION OF SUBSTANCES POSSIBI	LY PRESENT, KNOWN, (LG. WING TO		O ILA				
Unknown wastes from (API separator slud			d rel	ated act	ivi	ties. S	Suspect	ко51	
Potential for ground			ntami	nation.					
V. PRIORITY ASSESSMENT									
01 PRIORITY FOR INSPECTION (Check one. If h A. HIGH (Inspection required promptly)	igh or medium is checked, co B. MEDIUM (Inspection required)	mplete Part 2 - Waste Inform C. LOW (Inspect on time)		D. NO	NE	s Conditions and in		ition form)	
VI. INFORMATION AVAILABLE FRO	OM								
01 CONTACT		02 OF (Agency/Organiza	stion)					03 TELEPHON	
Bruce Beitler		PA DER Bu	ıreau	of Waste	Ma	nagemen	t	215) 27	70-1948
04 PERSON RESPONSIBLE FOR ASSESSME	NT	05 AGENCY	Bur.	of Wast	е	07 TELEPHON		08 DATE 6 / 3	30, 87
Chris Jaccarino		PA DER	I Mana	gement		ו עבבאו	70-1948	L - VONTH P	AV VEAD

EPA FORM 2070-12 (7-81)

	POTENTIAL HAZARDOUS WASTE SITE	I. IDENTIFICATION		
SEPA PART 3 - DES	PRELIMINARY ASSESSMENT CRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS	DΛ	SITE NUMBER 0781	
				
II. HAZARDOUS CONDITIONS AND INCIDI		**		
	02 □ OBSERVED (DATE:) 04 NARRATIVE DESCRIPTION	POTENTIAL	□ ALLEGED	
See narrative			·	
	02 □ OBSERVED (DATE:) 04 NARRATIVE DESCRIPTION	X POTENTIAL	□ ALLEGED	
See narrative				
01 © C. CONTAMINATION OF AIR 03 POPULATION POTENTIALLY AFFECTED:	02 □ OBSERVED (DATE:) 04 NARRATIVE DESCRIPTION	□ POTENTIAL	□ ALLEGED	
		·		
01 □ D. FIRE/EXPLOSIVE CONDITIONS 03 POPULATION POTENTIALLY AFFECTED:	02 □ OBSERVED (DATE:) 04 NARRATIVE DESCRIPTION	□ POTENTIAL	□ ALLEGED	
01 DE. DIRECT CONTACT 03 POPULATION POTENTIALLY AFFECTED:	02 □ OBSERVED (DATE:) 04 NARRATIVE DESCRIPTION	□ POTENTIAL	□ ALLEGED	
01 ☐ F. CONTAMINATION OF SOIL 03 AREA POTENTIALLY AFFECTED:	02 ☐ OBSERVED (DATE:) 04 NARRATIVE DESCRIPTION	□ POTENTIAL	□ ALLEGED	
01 ☐ G. DRINKING WATER CONTAMINATION 03 POPULATION POTENTIALLY AFFECTED:	02 □ OBSERVED (DATE:) 04 NARRATIVE DESCRIPTION	□ POTENTIAL	□ ALLEGED	
01 H. WORKER EXPOSURE/INJURY 03 WORKERS POTENTIALLY AFFECTED: _	02 □ OBSERVED (DATE:) 04 NARRATIVE DESCRIPTION	□ POTENTIAL	□ ALLEGED	
01 I. POPULATION EXPOSURE/INJURY 03 POPULATION POTENTIALLY AFFECTED:	02 □ OBSERVED (DATE:) 04 NARRATIVE DESCRIPTION	☐ POTENTIAL	□ ALLEGED	

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POTENTIAL HAZARDOUS WASTE SITE

1	I. IDENTIFICATION							
1	01 STATE	02 SITE NUMBER						
ı	DΛ	0781						

	IARY ASSESSMENT ZARDOUS CONDITIONS AND INCIDENTS	O1 STATE 02 S	_0781
II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)			
01 □ J. DAMAGE TO FLORA 04 NARRATIVE DESCRIPTION	02 □ OBSERVED (DATE:)	☐ POTENTIAL	□ ALLEGED
01 □ K. DAMAGE TO FAUNA 04 NARRATIVE DESCRIPTION (Include name(s) of species)	02 OBSERVED (DATE:)	☐ POTENTIAL	□ ALLEGED
01 L. CONTAMINATION OF FOOD CHAIN 04 NARRATIVE DESCRIPTION	02 OBSERVED (DATE:)	☐ POTENTIAL	□ ALLEGED
		· ·	
01 M. UNSTABLE CONTAINMENT OF WASTES (Spills/runof/I/standing liquids/leaking drums) 03 POPULATION POTENTIALLY AFFECTED:	02 OBSERVED (DATE:) 04 NARRATIVE DESCRIPTION	□ POTENTIAL	□ ALLEGED
01 □ N. DAMAGE TO OFFSITE PROPERTY 04 NARRATIVE DESCRIPTION	02 □ OBSERVED (DATE:)	□ POTENTIAL	□ ALLEGED
01 O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs 04 NARRATIVE DESCRIPTION	02 □ OBSERVED (DATE:)	□ POTENTIAL	□ ALLEGED
01 D P. ILLEGAL/UNAUTHORIZED DUMPING 04 NARRATIVE DESCRIPTION	02 OBSERVED (DATE:)	□ POTENTIAL	□ ALLEGED
05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEC	GED HAZARDS		
III. TOTAL POPULATION POTENTIALLY AFFECTED:			
IV. COMMENTS			
V. SOURCES OF INFORMATION (Cite specific references, e. g., state tiles, s	sample analysis. reports)		
Same as Part 2, Section VI.			

EPA FORM 2070-12 (7-81)

I SEPA			ENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT PART 2 - WASTE INFORMATION			01 STATE 02 SITE NUMBER PA 0781	
U WASTEST	TATES, QUANTITIES, AN	D CHARACTERI					
O1 PHYSICAL STATES (Check all that apply) O2 WASTE QUANTITY (Measures of war and the state of		TY AT SITE waste quantities ndependent)	O3 WASTE CHARACTERISTICS (Check all that apply) X A. TOXIC		E [] I. HIGHLY 1 DUS [] J. EXPLOS ABLE [] K. REACTI	IVE VE PATIBLE	
III. WASTE T	YPE	·					
CATEGORY	SUBSTANCE N	AME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMÉNTS		
SLU	SLUDGE	7	5,000,000	gallons	API Separ	ator Sludge	
OLW	OILY WASTE						_
SOL	SOLVENTS						
PSD	PESTICIDES						
occ	OTHER ORGANIC CH	IEMICALS					
IOC	INORGANIC CHEMIC	ALS					
ACD	ACIDS						
BAS	BASES						
MES	HEAVY METALS	 					
IV. HAZARD	OUS SUBSTANCES (See A)	opendix for most frequent	ly cited CAS Numbers)	L	L		
01 CATEGORY	02 SUBSTANCE NAME		03 CAS NUMBER 04 STORAGE/DISPOSAL MET		POSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
				T			
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	· ····································			<u> </u>			<u> </u>
V. FEEDSTO	V. FEEDSTOCKS (See Appendix for CAS Numbers)						
CATEGORY	01 FEEDSTOC	KNAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOC	KNAME	02 CAS NUMBER
FDS				FDS			
FDS				FDS			
FDS				FDS			
FDS				FDS			
VI. SOURCES	OF INFORMATION (Cite	specific references, e.g	state files, sample analysis,	reports)			

EPA FORM 2070-12 (7-81)

PA DER Regional Office Files; Interviews with B.P. Oil personnel; On-site visits; Telephone conversations with ARCO Petroleim Products personnel.

FIELD TRIP SUMMARY REPORT

This summary should be prepared in conjunction with the Preliminary Assessment Form, (EPA Form T2070-2), so that a proper site rating can be assigned.

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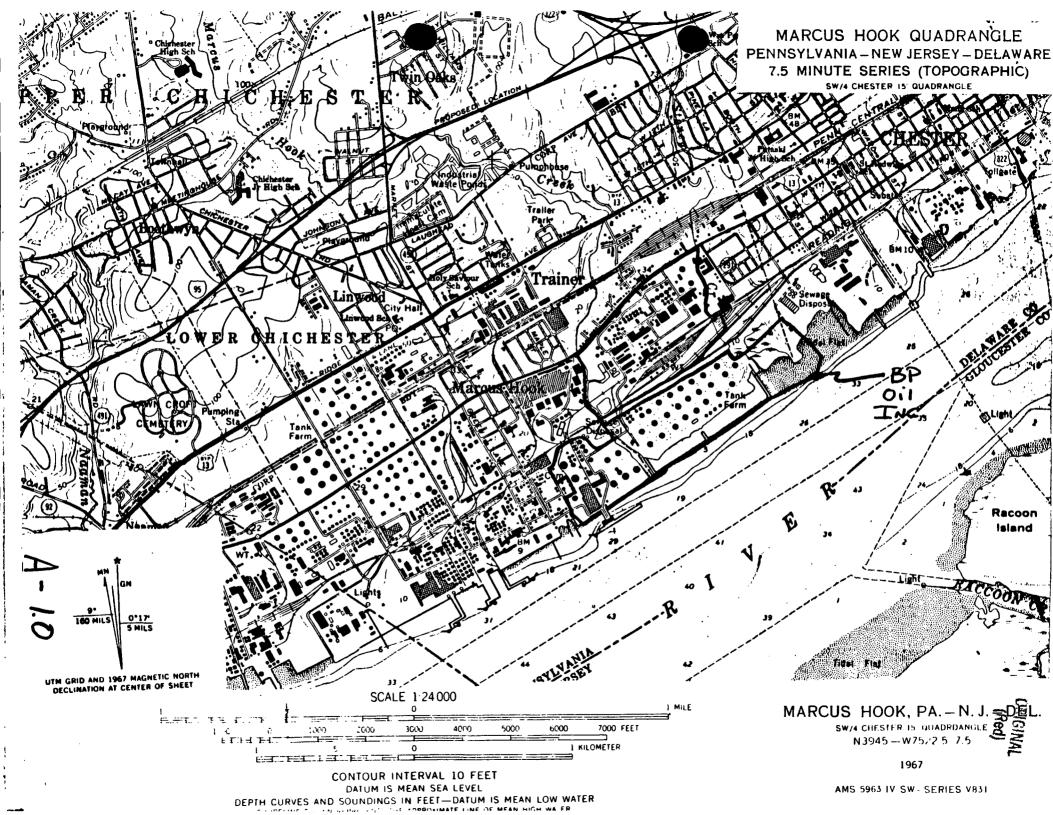
FIELD TRIP SUMMARY REPORT

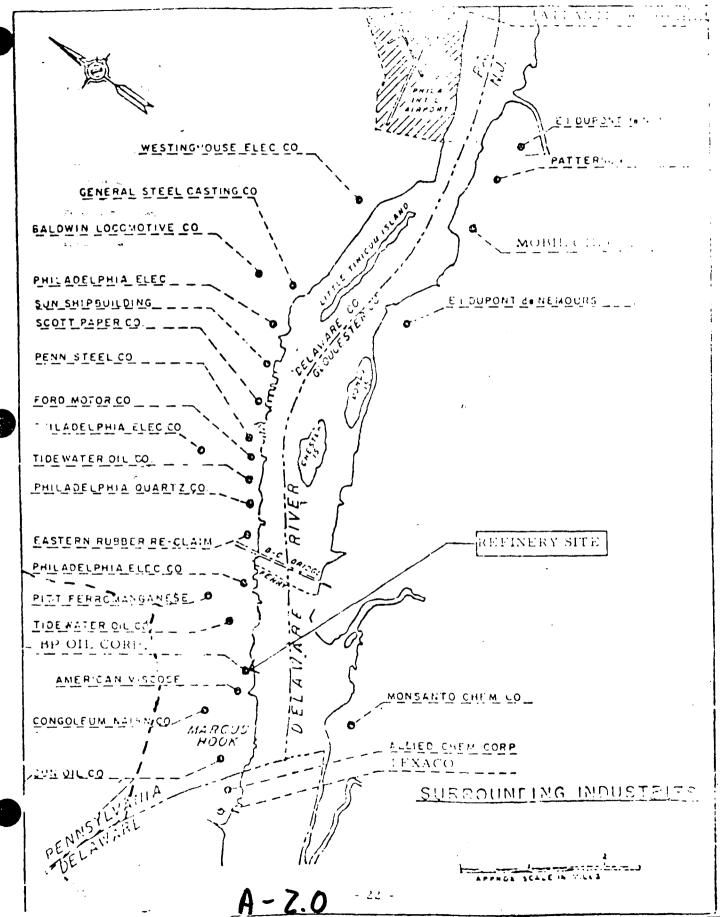
C.	Water s	supply for area. (CHECK ONE) Chester Water Authority - supply sources are located
	2. Mur	rface intakes (locate on attached map) (b) (9) nicipal wells (locate on attached map) therefore, no impact on local water supply is
		Approximate number within 1/4 mile
		Property owner
		Address
		Phone no.
		Well records YES NO YES
	c.	If odor or taste problems are reported please elaborate:
D.		rface or subsurface, (leachate), drainage areas from site at? YES NO _X . If yes:
		re unusual odors or stains noted? YES NO NO NO NO
	a.	If yes please note area on map.
E.	If yes,	reams or receiving waters adjacent to site? YES X NO, list observations: (i.e change in benthic community, change it density/diversity, change in color, siltation, etc.).
	Marcus	Hook Creek adjacent to site - Creek receives overflows from
	impound	ment, however, overflow pipe is designed such that floating
	oil wi	ll-not-discharge-to-creek:
F.	Site to	opography: (i.e plateau, strip mine ravines, etc.).
	Coasta	l plain
G.	Other o	observations: (i.e erosion, located in floodplain, etc.).

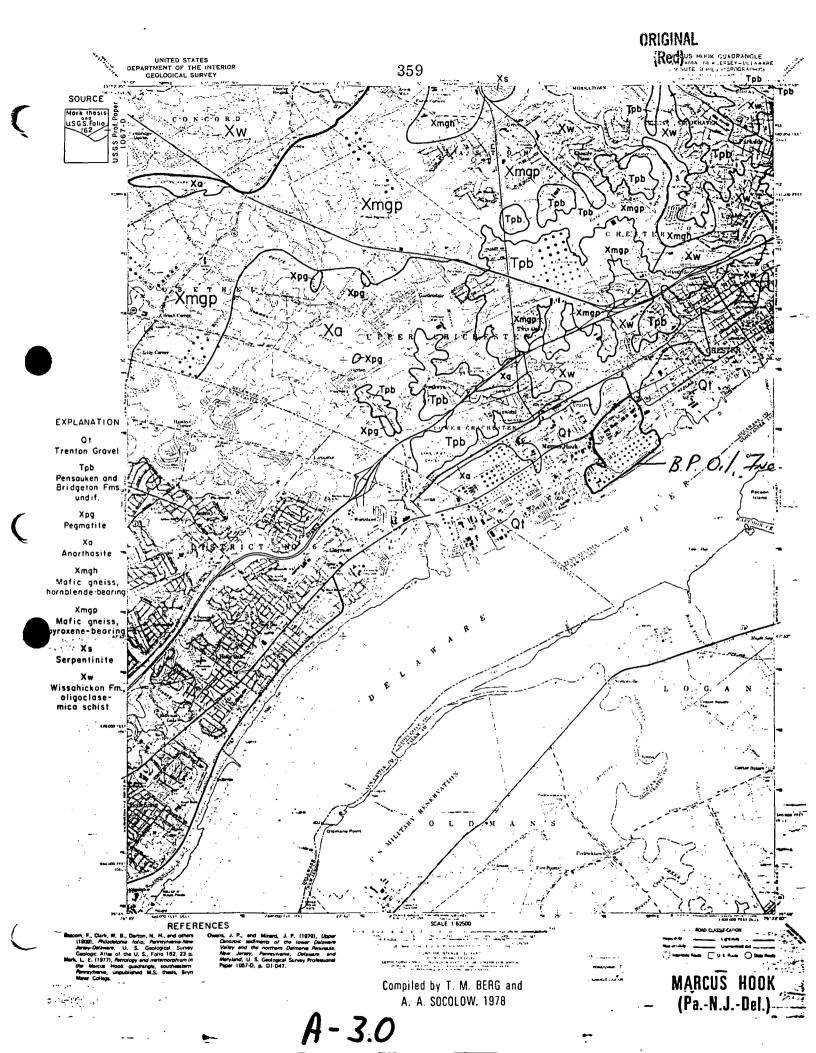
FIELD TRIP SUMMARY REPORT

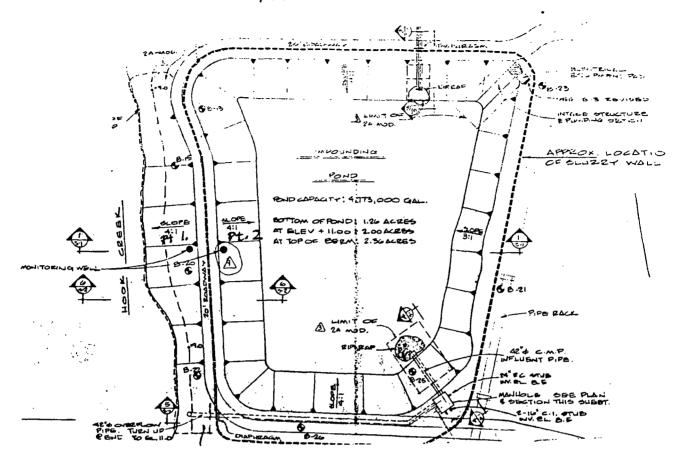
Page 3

٧.	If yes: Who has custody of photos?
	Name:
	Agency:
	Phone No.:
VI.	Is a hydrogeological survey for this site attached? YES NO X-If no, Section III D of EPA Form T2070-2 must be completed.
VII.	Please attach pertinent copies of reports or data reviewed by inspector: (i.e State monitoring data, consultant reports, etc.).
VIII.	Name of Inspector: Chris Jaccarino
	Agency: PA-DER-Bureau of Waste Management
	Phone No.:(215) 270-1948
	Time on Site: 6/8/87-9:30-a.m11:00-a.m.
	Weather Conditions:Sunny; hot (temp: -high 80's); humid

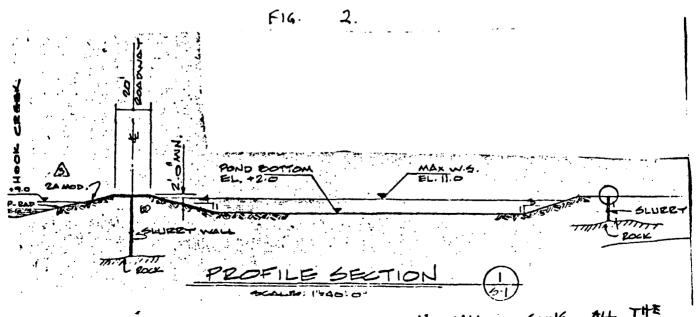






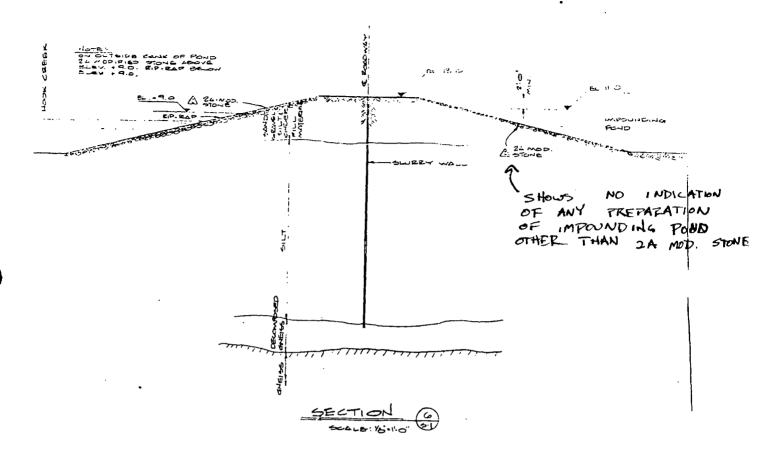


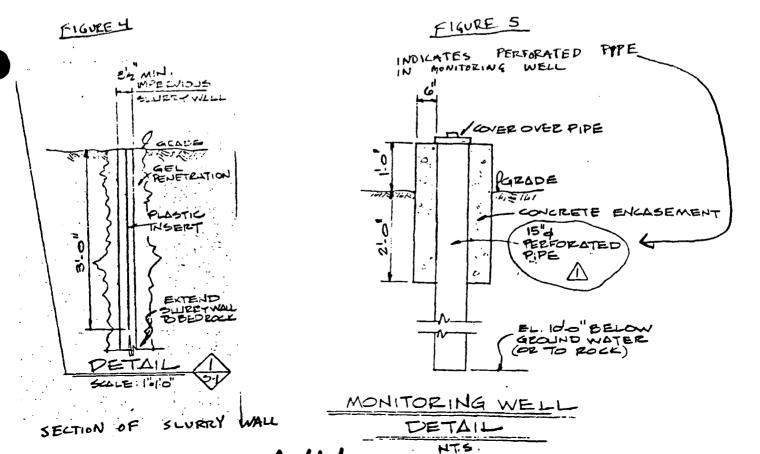
Impounding Pond YELLOW OUTLINE SHOWS SLURRY WALL



SIDE VIEW SHOWING SEVERY WALL GOING ALL THE WAY TO THE ROCK,

A-4.0





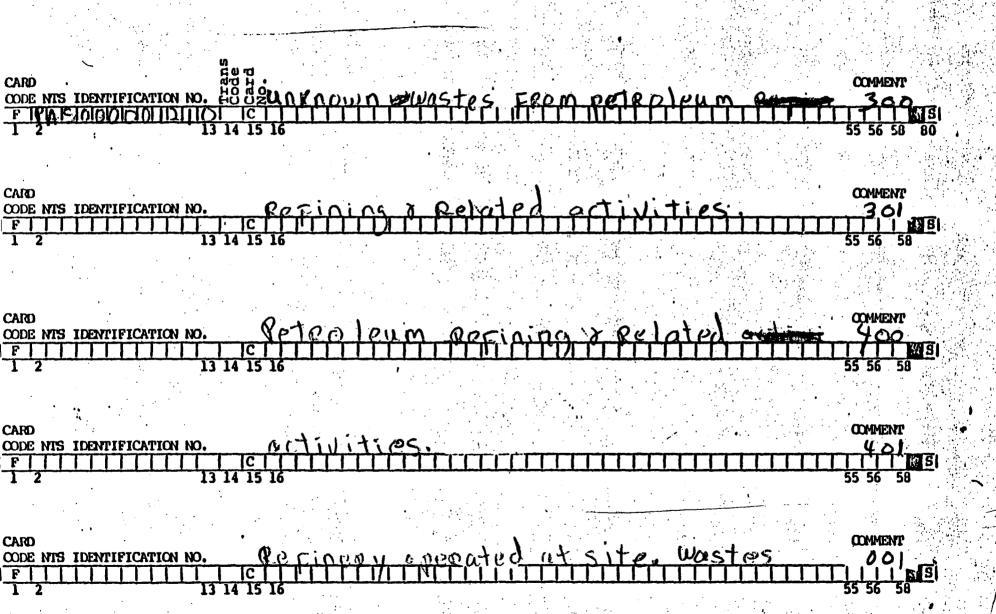
A-4.1

6	EPA Notification of	Hazardous			ORIGINAL United Statesed) Environmental Protection Agency
		410609	PAS-000-	001-210	- Washington DC 20460
•	· This initial notification information is	Please type or print	in ink. If you need	ever, a rer	inery was operated a
	required by Section 103(c) of the Compre- hensive Environmental Response, Compen-	additional space, use paper. Indicate the le			It was common indust
	sation, and Liability Act of 1980 and must	which applies.			dispose of wastes o ds. We may have fol
		ere are no reco			iling disposal prac-
	ha	indling at this	site. However,		wastes may have bee
Ā	Person Required to Notify:	ADON'D	-1 D1		hazardous under RCRA
	Enter the name and address of the person		oleum Products	· 	
	or organization required to notify.	Street 515 South	Flower Street C	Vanoria	
(1)	A Division of Atlantic Richfiel	Tam Namala		<i>(</i>	00071
	Company, Los Angeles, Car	City LOS Angele		State CA	Zip Code 90071
В	- Site Location:	and the second s			and the second s
Ξ.	Enter the common name (if known) and	Name of Site ARCO	petroleum prol	JTS. MARCU	IS HOOK REFINER
	actual location of the site.				
•		Street Post R	oad, P.O. BOX 42	9	
		city Marcus Hook	County De LL	12UState PA	Zip Code 19061
$\overline{\mathbf{c}}$	son to Contact:	100			
•	Enter the name, title (if applicable), and	Name (Last, First and Title	Pope Arthur F	. Mar. Envi	r Policy & Planning
	business telephone number of the person	Phone (213) 48			
	to contact regarding information submitted on this form.	Phone (213) 48	6-1913		
	PAD 07 161 268-3	200	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	•	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
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D .	Dates of Waste Handling:				
•	Enter the years that you estimate waste treatment, storage, or disposal began and ended at the site.	From (Year) 1925	To (Year) 1969	· · ·	
	* 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		en e	•	
	. <u></u>				
Ε	Waste Type: Choose the option you pre	efer to complete			
	Option I: Select general waste types and so you do not know the general waste types or	sources, you are	Resource Conserva	tion and Recovery	persons familiar with the Act (RCRA) Section 3001
	encouraged to describe the site in Item I-D	escription of Site.	regulations (40 CFF	Part 261).	المحمد المام ا المحمد المام ا
i	peral Type of Waste: te an X in the appropriate boxes. The categories listed overlap. Check each applicable Source of Place and boxes.	f Waste: X in the appropriate	listed in the regulat	i four-digit numbe ions under Sectio	er to each hazardous waste on 3001 of RCRA. Enter the boxes provided. A copy of
	category.		the list of hazardou	s wastes and code	es can be obtained by
	,		contacting the EPA	Region serving th	e State in which the site is
	1. 🗆 Organics 1. 🗆 Mir	•	, , , , , , , , , , , , , , , , , , ,	; · · · · · · ·	esta de la companya d
	· · •	nstruction			
	3. Solvents 3. Tex				
	4. Pesticides 4. Fer				/
		er/Printing			
		ther Tanning /Steel Foundry			
		emical, General			
		ting/Polishing		ļ	4
		itary/Ammunition			
	A STATE OF THE PARTY OF THE PAR	ctrical Conductors			
	Unknown wastes from pe- 12. Tra		<u> </u>		٠
	troleum refining and 13. Util	ity Companies	1 / 37	7	e de la companya del companya de la companya del companya de la co
		nitary/Refuse	<i>- 27</i> ,	75 38 N	J.
	15. 🗆 Pho	otofinish	<i>.</i>	, .	. • · · · · · · · · · · · · · · · · · ·
	· · · · · · · · · · · · · · · · · · ·	/Hospital		EPA II	
	17. <u>C. Uni</u>			RCRT of	
	. <u>☐8. ☑ Oth</u>	er (Specify)	•	. 그 건 권	

16. ☐ Lab/Hospital 17. C Unknown ☐8. ☑ Other (Specify) Petroleum refining

Form Approved OMB No. 2000-0138 EPA Form 8900-1

	Notification of Hazardous Waste Site	Sid: Twc		ORIGINAL *******	
F	* Waste Quantity:	Facility Tyre	Total Facility Wast		
	Place an X in the appropriate boxes to indicate the facility types found at the site.	1. ☐ Piles 2. ☐ Land Treatment	cubic feet CANTOWII	<u> </u>	
	In the "total facility waste amount" space	3. 12 Landfill	gallons		
	give the estimated combined quantity (volume) of hazardous wastes at the site	4. Tanks	Total Facility Area		
	using cubic feet or gallons.	5. Impoundment 6. Underground Injection	square feet Unknow		
	In the "total facility area" space, give the estimated area size which the facilities	7. Drums, Above Ground	acres		
	occupy using square feet or acres.	8. Drums, Below Ground			
_	The state of the s	9. St Other (Specify) Unknown	DWI1		
G ·					
	Place an X in the appropriate boxes to indicate or likely releases of wastes to the environment		☐ Known ☐ Suspect	ted 🗆 Likely 🗆 None	
	Note: Items Hand I are optional. Completin hazardous waste sites. Although completing	g these items will assist EPA and Sta	Unknown ate and local governments in encouraged to do so.	locating and assessing	
H	Sketch Map of Site Location: (Option				
	Sketch a map showing streets, highways,	i (A recognition of the second se	
	routes or other prominent landmarks near site. Place an X on the map to indicate			en en en gelanger i de remegalen en e 1812 e de Salva (1888 - 1888)	
(site location. Draw an arrow showing me direction north. You may substitute a				
	publishing map showing the site location.		V		
-		e de la companya de La companya de la co	neste de la companya	and the second s	
	et et e				
		A The Control of the			
	en e				
	en e		•	ادی قصور است در	
			•	المعداد والمراجع	
				and the second second	
	\$ 2 D				
1	Description of Site: (Optional)			en di e i i i kaseletik.	
(Rescribe the history and present inditions of the site. Give directions to	- · ·			
•	springs, lakes, or housing. Include such	•			
	information as how waste was disposed	the second of the second		1 % 4 % 4 % 4 % 4 % 4 % 4 % 4 % 4 % 4 %	
	and where the waste came from. Provide any other information or comments which	•	•		
	may help describe the site conditions.	• • • • • • • • • • • • • • • • • • •			
			•		
		•	,		
				2	
•	• "				
			· · · · · · · · · · · · · · · · · · ·		
_	Signature and Title:				
J	The person or authorized representative	Name Arthur F. Pope, Mgr.,	Envir. Policy &	П Ония 	
	(such as plant managers, superintendents, trustees or attorneys) of persons required		Planning	☐ Owner, Present☐ Owner, Past	
	to notify must sign the form and provide a mailing address (if different than address	Street 515 South Flower Str	<u>eet </u>	□ Transporter□ Operator, Present	
	in item A). For other persons providing	city Los Angeles sta	ate CA Zip Code 90071		
	notification, the signature is optional. Check the boxes which best describe the		7	☐ Operator, Past☐ Other	
	relationship to the site of the person required to notify. If you are not required	Signature . (ORC Date 6 8 81		
	to notify check "Other".	B-1.1		•	



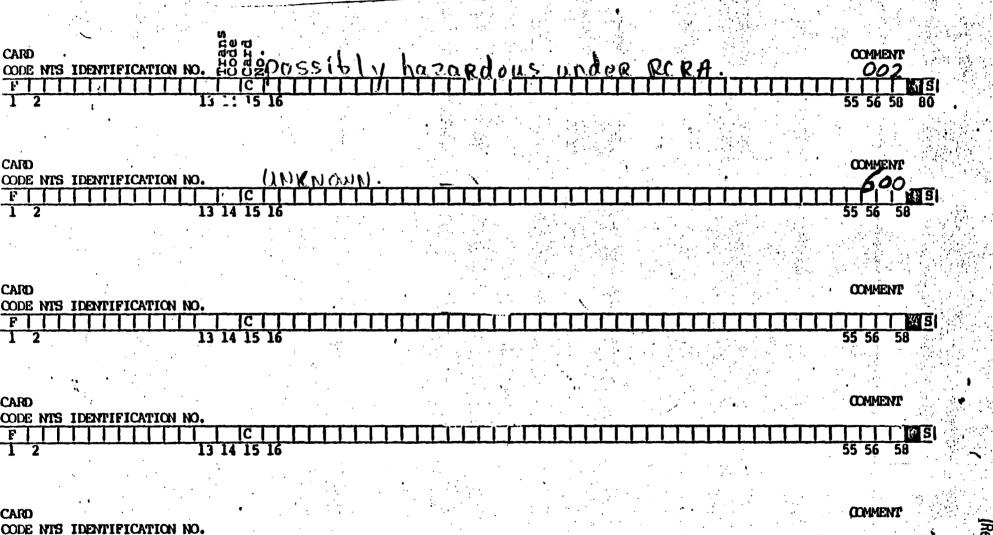
(Red)

B-13

F

13 14 15 16

ENVIRONMENTAL PROTECTION AGENCY NOTIS DATA MANAGEMENT SYSTEM COMMENT MAINTENANCE FORM



ARCO Petroleum Products Company 515 South Flower Street Mailing Address: Box 2679 - T.A. Los Angeles, California 90051 Telephone 213 486 1913

> A. F. Pope Manager Environmental Policy and Planning

June 8, 1981

RETURN RECEIPT REQUESTED

RECEIPT REQUESTED

REPAREMENT

(Red)

ORIGINAL

JUN 3 80000252

U.S. EPA Region 3
Sites Notification
Philadelphia, Pennsylvania 19106

Gentlemen:

ARCO Petroleum Products Company, a division of Atlantic Richfield Company, hereby submits its Comprehensive Environmental Response, Compensation, and Liability Act - Section 103(c) notification to EPA for locations where hazardous wastes may have been treated, stored, or disposed of, including petroleum refinery facilities presently operated by ARCO Petroleum Products and those petroleum refinery facilities which Atlantic Richfield Company or its predecessor companies owned or operated at the time of waste treatment, storage, or disposal.

This is a good faith effort to report the required information with a reasonable degree of accuracy commensurate with the timeframe available following the publication of EPA's implementing requirements in the Federal Register, Vol. 46, No. 72, Wednesday, April 15, 1981. The locations reported were identified by a review of Atlantic Richfield archives and related historical data, using Company and contractual resources. The information provided is based, for presently operated facilities, on personal knowledge or recollection of present employees or reasonably available records. For facilities owned or operated by predecessor companies, the information is based on the presumption that, since it was common industry practice to dispose of wastes on plant grounds, the prevailing disposal practice may have been collowed. Such wastes may have been considered hazardous under RCRA regulations. In some instances, personal knowledge or recollection of present employees supported this premise. No records of waste disposal practices were found to be available for previously owned or operated facilities.

A summary explanation is attached describing the approach taken in developing the information reported on EPA Form 8900-1 for facilities presently operated and for facilities previously owned or operated by Atlantic Richfield Company or its predecessor companies at the time of waste treatment, storage, or disposal.

Please contact Mr. A. F. Pope, Manager, Environmental Policy and Planning, ARCO Petroleum Products Company, 213/486-1913 regarding the information submitted on the enclosed forms.

Very truly yours,

AFP/mac

R-1.4

Attachments

ARCO PETROLEUM PRODUCTS COMPANY A DIVISION OF ATLANTIC RICHFIELD COMPANY

Facilities Previously Owned or Operated by Atlantic Richfield Company or Its Predecessor Companies or Operated by ARCO Petroleum Products Company

DISCUSSION OF INFORMATION SUBMITTED ON EPA FORM 8900-1, "NOTIFICATION OF HAZARDOUS WASTE SITE"

GENERAL QUALIFICATION

There are no records of waste handling at these sites. In most instances, there is no recollection or knowledge by present employees of waste handling at these sites. However, petroleum refineries were owned or operated by Atlantic Richfield Company or its predecessor companies at these locations. It was common industry practice to dispose of any wastes on plant grounds. We may have followed the prevailing disposal practice. Such wastes may have been considered hazardous under RCRA regulations.

PART A -- PERSON REQUIRED TO NOTIFY

ARCO Petroleum Products Company is a division of Atlantic Richfield Company. Petroleum refineries are operated by this division. Petroleum refineries owned or operated by Atlantic Richfield Company or its predecessor companies are being notified for by ARCO Petroleum Products Company.

PART B -- SITE LOCATION

Former petroleum refinery locations are given by the street address and city at the time of operation where the information has been available. Where specific address information is not available, the city at the time of operation is provided.

PART C -- PERSON TO CONTACT

The single point of contact for all notifications by ARCO Petroleum Products Company is Arthur F. Pope, Manager, Environmental Policy and Planning, located in Los Angeles, California.

PART D -- DATES OF WASTE HANDLING

Former petroleum refineries owned or operated by Atlantic Richfield Company or its predecessor companies are notified for the earliest known date of facility operation through the latest known date of facility operation.

PART E -- WASTE TYPE

Option 1 has been selected for notification. This option provides the needed flexibility to report known hazardous wastes and the probability that some unknown type of wastes were disposed as a consequence of petroleum refining and related activities. Some of the unknown wastes may have been considered hazardous under RCRA regulations.

B-1.5

ARCO PETROLEUM PRODUCTS COMPANY A DIVISION OF ATLANTIC RICHFIELD COMPANY

Facilities Presently Operated By ARCO Petroleum Products Company

DISCUSSION OF INFORMATION SUBMITTED ON EPA FORM 8900-1, "NOTIFICATION OF HAZARDOUS WASTE SITE"

GENERAL QUALIFICATION

This is a good faith effort to report the required information with a reasonable degree of accuracy. The information provided is based on personal knowledge or recollection of present employees or reasonably available records.

PART A -- PERSON REQUIRED TO NOTIFY

ARCO Petroleum Products Company is a division of Atlantic Richfield Company. Petroleum refineries are operated by this division.

PART B -- SITE LOCATION

Existing petroleum refinery locations are given by current street address and city. All aspects of facility waste management which require notification are provided on this basis.

PART C -- PERSON TO CONTACT

The single point of contact for all notifications by ARCO Petroleum Products Company is Arthur F. Pope, Manager, Environmental Policy and Planning, located in Los Angeles, California.

PART D -- DATES OF WASTE HANDLING

ARCO Petroleum Products Company facilities are notified for the earliest known date of facility operation as a refinery through the present.

PART E -- WASTE TYPE:

Option 1 has been selected for notification. This option provides the needed flexibility to report known hazardous wastes and the probability that some unknown type of wastes were disposed as a consequence of petroleum refining and related activities. Some of the unknown wastes may have been considered hazardous under RCRA regulations.

PART F -- WASTE QUANTITY

Facility type, waste amount, and area have been determined to the accuracy possible based on personal knowledge or recollection of present employees or reasonably available records. A complete description of facility types, waste amounts, and extent of areas of disposal is not possible, due to the age of the facilities.

PART G -- KNOWN, SUSPECTED OR LIKELY RELEASES TO THE ENVIRON-

An additional response "unknown" has been used instead of the available responses. ARCO Petroleum Products Company does not have sufficient information to make the determinations as set forth on the form. While no releases are known, suspected, or likely, we have no specific evidence that none have occurred. The only response appropriate with our knowledge is "unknown".

PART H -- SKETCH MAP OF SITE LOCATION (OPTIONAL)

The presently operated petroleum refinery locations at which waste refinement, storage, or disposal occurred in the past which may be subject to CERCLA Section 103(c) notification are identified in Part B — Site Location. No map is required to locate these refineries.

PART I -- DESCRIPTION OF SITE (OPTIONAL)

The presently operated petroleum refinery locations at which waste treatment, storage, or disposal occurred in the past which may be subject to CERCLA Section 103(c) notification are described in detail in RCRA Part A applications for each facility. No additional description is required.

PART J -- SIGNATURE AND TITLE

The single point of contact authorized to sign the form for ARCO Petroleum Products Company is Arthur F. Pope, Manager, Environmental Policy and Planning, located in Los Angeles, California.



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EPA Form 8900-1

Notification of Hazardous Waste Site

(Red)

United States Environmental Protection Agency Washington DC 20460

This initial notification information is required by Section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and must be mailed by June 9, 1981.

Please type or print in ink. If you need additional space, use separate sheets of

Person Required to Notify:							
Enter the name and address of t	the person	Name BP OIL	INC.				
or organization required to notify.		Street P.O. BOX 428					
	4	city MARCUS I	100 K	State PA	Zin Code	19061	
		City MARCUS I	100K	State FA	Zip Code	19001	
Site Location:		u (a: BP ∩	IL INC, MARCUS	HOOK DEETN	JEDV		
Enter the common name (if know	wn) and	Name of Site DP U.	. MARCOS	HOOK KEITI	LLI		
actual location of the site.		Street POST	ROAD				
		cay MARCUS HO	OCK County DELAWA	RE State PA	Zip Code	19061	
Person to Contact:			MADTINI C.C.	ENGINEE	NING CD	ECTAL TO	
r the name, title (if applicab			MARTINI, S.C.		KING SP	ECTALIS.	
ness telephone number of the contact regarding information	ne person	Phone (215) 49	94-3600, EXTENS	ION 351			
submitted on this form.							
Dates of Waste Handling:							
Enter the years that you estimat treatment, storage, or disposal b		From (Year) 1949	To (Year) DDESE	NT			
ended at the site.	egan and			+1 1			
							
Waste Type: Choose the opti	ion you pre	efer to complete					
Option I: Select general waste t you do not know the general wa encouraged to describe the site	iste types or	sources, you are	Option 2: This option Resource Conservations (40 CFR	on and Recovery	persons far Act (RCRA	niliar with the Section 300	
General Type of Waste:	Source o	f Waste:	Specific Type of Wa				
Place an X in the appropriate		X in the appropriate	EPA has assigned a listed in the regulati	four-digit numbe	er to each h	azardous wa RCRA Enter	
boxes. The categories listed rlap. Check each applicable	boxes		: appropriate four-digi	t number in the	boxes provi	ded. A copy⊹	
egory			the list of hazardous contacting the EPA F	wastes and cod Region serving th	es can be o ne State in	btained by which the sit	
1 = 0	4 🗂 🗠	_ •	located	logion solving a	io otața		
 □ Organics □ Inorganics 	1. □ Mii	ning nstruction	7051		7 —		
3. Solvents	3. □ Tex		K051				
4. Pesticides	4. □ Fer		<u>K052</u>				
5. ☐ Heavy metals		per/Printing	<u> </u>		-		
6. □ Acids			<i>!</i> :	ì	⊣	į.	
7. 🗆 Bases	6 Illes	other Tanning	\ <u> </u>		1 !		
7. 🗆 Du 303		ather Tanning			- !	t	
8 D PCRs	7. 🗆 Iro	n/Steel Foundry					
8. PCBs Mixed Municipal Waste	7. ☐ Iro 8. ☐ Ch	n/Steel Foundry emical, General					
9. 🗆 Mixed Municipal Waste	7. ☐ Iro 8. ☐ Ch 9. ☐ Pia	n/Steel Foundry emical, General iting/Polishing					
9. 🗆 Mixed Municipal Waste 10. 🗆 Unknown	7. 🗆 Iro 8. 🗆 Ch 9. 🗆 Pla 10. 🗆 Mi	n/Steel Foundry emical, General iting/Polishing litary/Ammunition					
9. 🗆 Mixed Municipal Waste 10. 🗆 Unknown	7. ☐ Iro 8. ☐ Ch 9. ☐ Pla 10. ☐ Mi 11. ☐ Ele	n/Steel Foundry emical, General ting/Polishing litary/Ammunition ectrical Conductors					
9. 🗆 Mixed Municipal Waste 10. 🗆 Unknown	7.	n/Steel Foundry emical, General sting/Polishing litary/Ammunition ectrical Conductors ansformers					
9. 🗆 Mixed Municipal Waste 10. 🗆 Unknown	7. ☐ Iro 8. ☐ Chi 9. ☐ Pla 10. ☐ Mi 11. ☐ Ele 12. ☐ Tra 13. ☐ Uti	n/Steel Foundry emical, General sting/Polishing litary/Ammunition ectrical Conductors ansformers lity Companies					
9. 🗆 Mixed Municipal Waste	7. ☐ Iro 8. ☐ Chi 9. ☐ Pia 10. ☐ Mi 11. ☐ Ele 12. ☐ Tra 13. ☐ Uti 14. ☐ Sa	n/Steel Foundry emical, General sting/Polishing litary/Ammunition ectrical Conductors ansformers lity Companies nitary/Refuse					
9. ☐ Mixed Municipal Waste 10. ☐ Unknown	7.	n/Steel Foundry emical, General sting/Polishing litary/Ammunition ectrical Conductors ansformers lity Companies nitary/Refuse otofinish					
9. ☐ Mixed Municipal Waste 10. ☐ Unknown	7. ☐ Iro 8. ☐ Chi 9. ☐ Pla 10. ☐ Mi 11. ☐ Ele 12. ☐ Tra 13. ☐ Uti 14. ☐ Sa 15. ☐ Ph	n/Steel Foundry emical, General sting/Polishing litary/Ammunition ectrical Conductors ansformers lity Companies nitary/Refuse otofinish b/Hospita!					
9. ☐ Mixed Municipal Waste 10. ☐ Unknown	7. Iro 8. Ch 9. Pla 10. Mi 11. Ele 12. Tra 13. Ut 14. Sa 15. Ph 16. La 17. Ur	n/Steel Foundry emical, General sting/Polishing litary/Ammunition ectrical Conductors ansformers lity Companies nitary/Refuse otofinish b/Hospital					
9. ☐ Mixed Municipal Waste 10. ☐ Unknown	7. Iro 8. Ch 9. Pla 10. Mi 11. Ele 12. Tra 13. Ut 14. Sa 15. Ph 16. La 17. Ur	n/Steel Foundry emical, General sting/Polishing litary/Ammunition ectrical Conductors ansformers lity Companies nitary/Refuse otofinish b/Hospita!					
9. ☐ Mixed Municipal Waste 10. ☐ Unknown	7. Iro 8. Ch 9. Pla 10. Mi 11. Ele 12. Tra 13. Ut 14. Sa 15. Ph 16. La 17. Ur	n/Steel Foundry emical, General sting/Polishing litary/Ammunition ectrical Conductors ansformers lity Companies nitary/Refuse otofinish b/Hospital					

B-20

	Notification of Hazardous Waste Site	Side Two		•			
F	Waste Quantity:	Facility Type	Total Facility Waste	Amount,			
	Place an X in the appropriate boxes to	1. □ Piles	cubic feet	· · ·			
	In the "total facility types found at the site. In the "total facility waste amount" space give the estimated combined quantity (volume) of hazardous wastes at the site using cubic feet or gallons.	 2. □ Land Treatment 3. 芭 Landfill 	gallons BEST EST	IMATE-66,000			
		4. 🗆 Tanks	Total Facility Area square feet REST ESTIMATE - 8.1				
		5. 🖫 Impoundment					
	In the "total facility area" space, give the estimated area size which the facilities	6. □ Underground Injection7. □ Drums, Above Ground	acres				
	occupy using square feet or acres.	8. Drums, Below Ground	-				
		9. Other (Specify)					
G	Known, Suspected or Likely Releases						
•	Place an X in the appropriate boxes to indic or likely releases of wastes to the environm		☐ Known ☐ Suspecte	d Likely Ma None			
	Note: Items Hand I are optional. Completi hazardous waste sites. Although completi	ng these items will assist EPA and State ng the items is not required, you are enco	and local governments in l ouraged to do so.	ocating and assessing			
Н	Sketch Map of Site Location: (Option	nal) See attached map					
	Sketch a map showing streets, highways, routes or other prominent landmarks near		2///				
	the site. Place an X on the map to indicate the site location. Draw an arrow showing	Exhibit A-1 of	Prelimining Asse.	ssment a			
	the direction north. You may substitute a publishing map showing the site location.						
	publishing map showing the site location.						
•							
		·					
		•					
			·	<u> </u>			
1	Description of Site: (Optional)	1 hazardana manta in the	Dofinomile al.	J 10_00			
	Describe the history and present conditions of the site. Give directions to	1 hazardous waste in the (impoundment 60,000 Ft. ²					
	the site and describe any nearby wells,	All waste (5,000,000 gal	lons of API Sepa	arator 😈			
	information as now waste was disposed	sludge) was chem-fixed a in Deptford, NJ. An ad	nd sent to Kins. ditional 66,000				
	any other information or comments which						
	may help describe the site conditions.	(8100 Ft ² total). These	pits contain 1				
		bottoms.					
				·			
J	Signature and Title:	20	40.00	,			
	The person or authorized representative	Name E.S. KULINSKI	Lafunda	Owner, Present			
	(such as plant managers, superintendents trustees or attorneys) of persons required	_					
	to notify must sign the form and provide a mailing address (if different than address	Street		☐ Transporter ☑ Operator, Present			
	in item A). For other persons providing notification, the signature is optional.	City State	Zip Code	☐ Operator, Past			
	Check the boxes which best describe the relationship to the site of the person		6/0/01	☐ Other			
	required to notify. If you are not required to notify check "Other".	Signature	Date 7/4/	•			
-	to notify check of the .	B-2./		•			

6/30/76

	,			ORIGIN	AL	
•••	• • •	•^•	• • •	(Red)		.*.
For	D.B.	เพ็กเน	P/11.0	מונונ		-, -

Brown .

APPLICATION FOR WATER QUALITY MANAGEMENT PERMIT

APPLICANT NAME	ырлавлюяч	EX-TION .
}	(A) MUNICIPALITY	
B.P. 011 Inc.		
	Trainer	·
телерноне но. 215/494-3600		
MAILING ADDRESS	(B) COUNTY	
P.O. Box 428	Delawar	e
Marcus Hook, Pa. 19061		
HEREBY APPLIES FOR: (CHECK APPROPRIATE BLOCKS IN SE	1	
A. APPROVAL OF PLANS FOR CONSTRUCTION OF:	B. APPROVAL TO DISCHARGE:	C. APPROVAL TO OPERATE:
PUMP STATIONS; SEWERS AND APPURTENANCES	UNTREATED	UNDERGROUND MINE
SEWAGE TREATMENT PLANT		D. APPROVAL OF AN
MINE DRAINAGE TREATMENT PLANT	(2) MINDUSTRIAL WASTES	EROSION AND
MINDUSTRIAL WASTE TREATMENT PLANT OUTFALL AND HEADWALL	MINE DRAINAGE	☐ SEDIMENTATION
STREAM CROSSING		PLAN
(ALL DISCHARGES OF WASTES ARE PURSUAN		
I HEREBY CERTIFY THAT THE ACCOMPANYING: REPORT AND A THEREIN ARE ATTACHED TO THIS APPLICATION, AND MADE A P		MENTS DESIGNATED
THEREIN ARE ATTACHED TO THIS ATTECHTION, AND MADE AT	ART REREUP.),
	// ((((a)	Man
SIGN	ATURE OF APPLICANT OR HESPE	INSIBLE OFFICIAL
NAME OF APPLICANT OR NESPONSIBLE OFFICIAL:	TLE .	DATE OF APPLICATION
Mar W A Parasa		7/10/76
Mr. M. A. Pappas R	efinery Manager	7/19/76
		,
BP OIL, Incorporated, PO Box 428,		lvania 19061
COMMONWEALTH OF PENNSYLVANIA, COUNTY OF Delawar	<u>e</u>	
Y A Donner	DULY SWORN, ACCORDING TO LA	W. DEPOSE AND SAY
THAT I (AM THE APPLICANT) (AM AN OFFICER OR OFFICIAL OF	THE APPLICATIT) (HAVE THE AU	THORITY TO MAKE THIS
APPLICATION) AND THAT THE PLANS, REPORTS AND DOCUMENTS AND CORRECT TO THE BEST OF AY KNOWLEDGE AND BELIEF.	S. SUBMITTEDS PART OF THE A	PPILICATION ARE TRUE
SWORN AND SUBSCRIBED TO BEF RE ME THIS		
11/19# Duly . 76	1. 0 6	44
DAY OF 10 70	////. 12. 02	NICO !
The tout Plan	SIGNATURE OF APPLICANT OR	SYONSIBLE OFFICIAL
GUSTAVE NO CARYWINE SNOTARY PUBLIC	•	
THE SECTION AS THE TO BE COMPLETED BY THE PERSO	N AUTHORIZED BY THE APPLICA	INT TO PREPARE THE
APPLICATION WOOTE SEWITHALS INDUSTRIALS WASTE. AN	D MINE DRA NAGE APPLICATIO	NS REQUIRE A
REGISTERED PROFESSIONAL ENGINEER, EXCEPT THAT A R HEALTH AND SALETY ARC NOT INVOLVED.	EGISTERED E SHOT YOR IS ACC.	TANCE WITH HE POBLIC
NAME OF DESIGN ENGINEER (OR SURVEYOR) AND FIRM		1000
Charles Y. Hitchcock, Jr. Metcalf	& Eddy Inc.	ELICA ENCHAPATION
MAILING ADDRESS	TELEPHONE NUMBER	ESIGN ENGINEER'S
50 Staniford St., Boston, Mass. 02114	617/ 523-1900	(OR SURVEYOR'S)
AGREEMENT DATE SIGNATURE OF DESIGN ENGINEER FOR SURVE	YORI A	1) SEAL GO
Not responsive due to revise	a scope	10 118 M

CATCHICFARED "6-30-76

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES WATER QUALITY MANAGEMENT

WATER POLLUTION CONTROL
MODULE 2 - GENERAL INFORMATION
INDUSTRIAL WASTES

- D.F.	18/		6	:::	•:
For Depar	imeni Us	OAÚR	IGINAL	*	∳ .71 ±
			De.tt		

2

				/D
APPLICANT B.P	. Oil Inc., P.O. Box 428, Ma	rcus Hook, Pa	a. 1906	1 .
LOCATION OF PROJECT	Trainer	COURTY_	Delawa	are
1	Non Responsive based on Revised S	cope Mad 3.0		
DESIGN ENGINEER AN	50 Staniford Street	Metcalf		
DESIGN ENGINEER'S A	DORESS Boston, Mass.	ZIP_02114 ELE	PHONE 61'	7/523-1900
DESCRIPTION OF PROT	construction of an impou	nding pond to	contair	n rainfall
surface runo	ff and overflows from the wa	stewater trea	atment fa	acilities
with subsequ	ent return pumping for treat	ment on a cor	ntrolled	basis.
PROPOSED PROJECT	IS EXISTING WILL BE COMPLETED ON I	DATE) 12/1/76	 	
				
. A. DOCUMENTATION	NEOUIRED	•		
1	FOR \$25.00 PAYABLE TO THE PENNSYLVANIA DE TAL RESOURCES, BEEN INCLUDED? (NOT REQUI		X yes	□ No □ N/A
OR FEBERAL	AGENCIES		× 1	
	S OF THE APPLICATION, ER-BWQ-51, BEEN SUBM IRED FOR PROJECTS IN THE DELAWARE RIVER I		X Yes	□ No
4 1140 THE 4	FFIDAVIT DEEN PROPERI Y COMPLETED AND E	SCOTENZ	X v.,	□ -10
B. HAS PROOF	F OF PUBLICATION BEEN SUBMITTED?	• .	· Yes	X No See Not
3. HAS A POLLU	TION INCIDE! T PREVENTION REPORT BEEN INC	LUDED7	Yes	X N₀See Not
4. DOES THE AP	PLICATION INCLUDE THE FOLLOWING APPLICAB	LE MODULES:	•	
. MODULE		NUMBER OF		
NUMBER	TITLE	PAGES		
2/	GENERAL INFORMATION - INDUSTRIAL WAS	TES 9	X Y.,	
4	WASTE LOND AND CHARACTERISTICS	3	X Yes	
5	GEOLOGY AND GROUND WATER INFORMATIO	ON 2	X Y	
8/	PUMPING ACILITIES	1.	X Yes	
9."	FLOW EOU ALIZATION AND STORAGE BASINS	1	X Yes	
10	GRIT CHA ARERS	. 1	Y**	
11	SCREENING AND COMMINUTING DEVICES	.2	Yes	
12	IMHOFF AND SEPTIC TANKS	2	v.,	
10-	SETTLING TANKS, CLARIFIERS AND THICKEN	cris 2	Y • 1	. •
14	EANTHER SCTTLING BASINS	? .	Y.,	**

Note 1

Public Notice was not given as the impoundment will not discharge - Regulation 800, Section 2.

Note 2

A Pollution Incident Prevention Report for the Refinery has been prepared and updated.

- 6,- 30 - 76

DEPAP (MENT OF ENVIRONMENTAL MENDHELD WATER QUALITY MANAGEMENT

WATER POLLUTION CONTROL
MODULE 2 – GENERAL INFORMATION
INDUSTRIAL WASTES

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For Depailing	3100°C - 1	~(Red); ;	

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Alternate B - Impounding Pond - Clay Liner - 1 sheet Alternate C - Impounding Pond - Manufactured Liner - 1 sheet		C. OTHER	SPECIFY TYPE AND NUMBERIL					
		Alter	nate B - Impounding Pond - Clay Line nate C - Impounding Pond - Manufactu	red Li	ner	- 1 s	heet	Ì

DETAILED DESCRIPTION OF PROJECT - IMPOUNDING POND

This permit application is for the construction of an impounding pond at the B.P. Oil, Inc. Refinery at Marcus Hook, Pennsylvania. The function of the pond is to contain contaminated rain runoff for storage. This runoff will be collected from various drainage ditches in the refinery and then conveyed to the pond influent structure by either gravity or pumps. The system is designed for a 10 year storm; 2 inches rainfall per hour for one hour. The pond will also serve as a storage basin for overflows from the API Separator (Surge Basin) which may occur during heavy rainstorms. The impounded water will then be pumped to the wastewater plant on a controlled basis for subsequent treatment.

The pond will have either an earthen clay liner, bentonite liner or PVC type liner, whichever is most economical. Any of these liners will provide an impervious barrier to leakage and groundwater infiltration. In order to ensure the integrity of the liner, an underdrainage system will be installed to prevent hydraulic uplift from the groundwater level. The underdrainage water will be pumped either into the pond or into Marcus Hook Creek depending upon the nature of the groundwater.

Any emergency overflows from the pond will go to Marcus Hook Creek. The overflow pipe is designed such that any floating oil in the pond will not be discharged to the creek.

SOIL EROSION CONTROL



All earth-moving activities shall be conducted in such a way as to prevent accelerated erosion and the resulting sedimentation. To accomplish this, the Contractors engaged in earthmoving activities shall implement and maintain erosion and sedimentation control measures as described on the attached Metcalf & Eddy, Inc., drawing C-7; or at the Contractor's option he may design, implement and maintain erosion and sedimentation control measures in accordance with Section 102.15 of the Pennsylvania Erosion Control Regulation (Pennsylvania Code, Title 25, Chapter 102 - Erosion Control: Adopted September 21, 1972).

THE STANDARD OIL COMPANY (OHIO)

OFFICERS

			•
c.	E.	Spahr	Chairman of the Board
A.	w.	Whitehouse	President
J.	D.	Harnett	Executive Vice-President
D.	G.	Stevens	Senior Vice-President
R.	M.	Donaldson	Vice-President
R.	G.	Griffin	Vice-President
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J.	L.	Locker	Vice-President
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A.	J.	M. ller	Treasurer
н.	s.	Mcller, Jr.	Corporate Secretary

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WATER QUALITY MANACH WENT

WATER POLLUTION CONTROL
MODULE 2 - GENERAL INFORMATION
INDUSTRIAL WASTES

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For Dgnayara	130 - O-1 DBIT	JANF.	• •

B. REQUIRED DATA - CONTINUED	•		• • • .	
4. ARC THE PLANS:				•
A. CLEAR, LEGIBLE, AND DRAWN TO SCALE?			X Yes	□ No
B. WITHIN MAXIMUM SIZE OF 36 INCHES BY 50 IN	ICHES?		X Yes	□ No
C. CLASS OF CONSTRUCTION				
1. TYPE: NEW REPLACEMENT OF EXIST ADDITION AND/OR MO! NO NEW CONSTRUCTION	DIFICATION	TO EXISTING FA		ILITY
D. PLANT STATUS	. •	•		•
1. IS THE INDUSTRIAL ESTABLISHMENT:	<u></u>	TING?	Marcus Ho B.P. Oil	of this plant ok Refinery Inc.
2. TYPE OF INDUSTRIAL ESTABLISHMENT (USE STA STATISTICAL STANDARDS):	NDARD COD	E OF UNITED ST	ATES OFFICE OF	
CODE 2911 DESCRIPTION	Pet	roleum Re	finery	
A. TYPE OF PRODUCT: Petroleum	Product	s	:	
B. DAILY PRODUCTION: 150,000 barre	els per	day	:	
C. DAYS PER YEAR OF PRODUCTION: 365	;	•	; <u></u>	
D. WORKING DAY: 24 hrs AM TO P	·M	•	7	DAYS PER WEEK
E. NUMBER OF EMPLOYEES				•
3. TYPE OF OWNERSHIP: INDIVIDUAL	conpora other is	ATION PECIFY)		· · · · · · · · · · · · · · · · · · ·
.4. HAS THIS APPLICATION BEEN FILED AS THE RESI DEPARTMENT ORDER, OR LEGAL STIPULATION?	ULT OF A VI	OLATION NOTICE	E Yes	X No.
5. THE DATE OF THE VIOLATION NOTICE, ORDER O	IR STIPULAT	ION IS	•	X 1/A
6. LIST BY NUMBER AND DATE ANY PREVIOUSLY IS	SSUED PERM	ITS NELEVANT T	O THIS INDUSTR	IAL ESTABLISHME (1
2371207 7/30/71 5	01T1	10/26/70	· .	
2372202 5/3/73	728Tl	10/27/70		•
NPDES -0012637 3	2T1	10/26/70		
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WATER
MODULE 2

WATER POLLUTION CONTROL MODULE 2 — GENERAL BIT ORMATION INDUSTRIAL WASTES

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For Depatingent Offe	Qn÷γ	«Red)	_

STE TREATMENT	,			□	ORIGINAL (निed)
ARE INDUSTRIAL WASTES N ESTABLISHMENT?	OW BEING PRODUCED BY THE	E INDUSTRIAL		(∆) Y•s	H0 .
A. IF YES, ARE THE INDUST	RIAL WASTES:				•
3) TREATED AND DISCH	UT TREATMENT? HARGED WITHOUT PERMIT? HARGED UNDER WATER OUA! NICIPAL SEWERAGE SYSTEM? R COMBINED SEWERS		NT PERMIT? M SEWERS		
NAME OF SYS	•	,	• •	-	
IF 3) OR 4), ABOVE,	why is the current application of an impor	cation being Ma	DE? To	obtair	ı a permi
B. WHAT PROCESS OR PROC	ESSES GENERATE THE WASTE	Petro	leum Re	fining	
HOCESS ON PRUC	THE WASTE				
INDUSTRIAL WASTE TREAT! TREATMENT PROVIDED.	SARE BEING TREATED IN AN MENT PLANT, BRIFFLY DESCRIPTIONS OF THE STATE	RIRF THE.	s follo		
INDUSTRIAL WASTE TREAT! TREATMENT PROVIDED.	ollowed by dual me	RIRF THE.	s follo	wed by	
INDUSTRIAL WASTE TREATI TREATMENT PROVIDED. API separator fo	ollowed by dual me	RIRF THE.	s follo	wed by	
THEATMENT PROVIDED. API separator for carbon adsorbers	ollowed by dual me	edia filter	s follo	wed by	
THEATMENT PROVIDED. API separator for carbon adsorbers	PLANT BRIFFLY DESCRIPTION OF SCHOOL BY DESCRIPTION OF SANITARY SEWA	edia filter cer GE7 Ma Ma		ook Boro	
INDUSTRIAL WASTE TREATMENT PROVIDED. API separator for carbon adsorbers WHAT IS THE METHOD OF D. IN PUBLIC SEWERAGE SYSTEMETERS	PLANT BRIFFLY DESCRIPTION OF SCHOOL BY DESCRIPTION OF SANITARY SEWA	edia filter GE? Ma Ma Tr	rcus Ho rcus Ho ainer B	ook Boro	,
INDUSTRIAL WASTE TREATITED. API separator for carbon adsorbers WHAT IS THE METHOD OF D. PRIVATE SEWAGE TREATITED.	DIOWED BRIFFLY DESCRIPTION OF STATEM	edia filter dia filter Ma Ma Tr tem by Ches	rcus Ho rcus Ho ainer B ter, Pa	ook Boro ook, Pa. Boro Tre	eatment
INDUSTRIAL WASTE TREATITED TREATMENT PROVIDED. API separator for carbon adsorbers WHAT IS THE METHOD OF DE CARBON ASSEMBLE STATE OWNERSHIP	ollowed by dual median of sanitany sewartem Collection Syst Trainer Boro, C	edia filter dia filter Ma Ma Tr tem by Ches City of Che	rcus Ho rcus Ho ainer B ter, Pa	ook Boro ook, Pa. Boro Tre	eatment
INDUSTRIAL WASTE TREATITED TREATMENT PROVIDED. API separator for carbon adsorbers WHAT IS THE METHOD OF DE CARBON ASSEMBLE STATE OWNERSHIP	ollowed by dual media. ISPOSAL OF SANITARY SEWANTEM COLLECTION Syst Trainer Boro, Collection System	edia filter dia filter Ma Ma Tr tem by Ches City of Che	rcus Ho rcus Ho ainer B ter, Pa	ook Boro ook, Pa. Boro Tre	eatment
MAT IS THE METHOD OF DEPARTMENT TO SERVER STATE OF THE METHOD OF DEPARTMENT OF THE METHOD OF THE MET	ollowed by dual media. ISPOSAL OF SANITARY SEWANTEM COLLECTION Syst Trainer Boro, Collection System	edia filter dia filter Ma Ma Tr tem by Ches City of Che	rcus Ho rcus Ho ainer B ter, Pa	ook Boro ook, Pa. Boro Tre	eatment
MAT IS THE METHOD OF DEPARTMENT TO SERVER STATE OF THE METHOD OF DEPARTMENT OF THE METHOD OF THE MET	ollowed by dual media. ISPOSAL OF SANITARY SEWANTEM COLLECTION Syst Trainer Boro, Collection System	edia filter dia filter Ma Ma Tr tem by Ches City of Che	rcus Ho rcus Ho ainer B ter, Pa	ook Boro ook, Pa. Boro Tre	eatment

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WATER CUALITY MANAGEMENT

WATER POLLUTION CONTROL
MODULE 2 - GENERAL INFORMATION
INDUSTRIAL WASTES

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For Dapament Windenly	•	-	 •		፥	_

E. WASTE TREATMENT - CONTINUED	
4. OPERATIONAL FEATURES	1
NOTE: IN ANSWERING THE FOLLOWING OUTSTIONS, INFORMATION PROVIDED MUST APPLY TO ALL UNITS OF TREATMENT PLANT,	
A. WILL STANDBY EQUIPMENT BE PROVIDED FOR ALL MECHANICAL UNITS IN THE TREATMENT PLANT?	
1.) IF NO, WILL SPARE PARTS BE STOCKED AT THE TREATMENT PLANT YOU NO FOR ALL CHITICAL MECHANICAL UNITS?	
2.) IF NO, ARE PARTS READILY AVAILABLE FROM LOCAL SUPPLIERS FOR REPAIRING MECHANICAL BREAKDOWNS?	
B. WILL PROCESS PRODUCING WASTES BE DISCONTINUED DURING PERIODS OF EQUIPMENT FAILURE? Yes X No	
1.) IF NO, DESCRIBE ANTICIPATED REDUCTION IN TREATMENT EFFICIENCY DURING EQUIPMENT FAILURE.	
Equipment is designed with standby units and therefore it is	_
anticipated that total equipment failure will not occur.	_
F. RECEIVING STREAM .	
1. WHAT IS THE NAME OF THE RECEIVING STREAM? Marcus Hook Creek	
(IF NO DISCHARGE TO STREAM, CHECK HERE AND NAME THE STREAM WHICH DRAINS THE AREA)	-
Delaware River	
A. TRIBUTARY OF: Delaware Kiver	
B. TRIBUTARY OF:	
	Ì
C. MAJOR DRAINAGE BASIN: DELAWARE DOTOMAC ALLEGHENY	
SUSQUEHANNA LAKE ERIE MONONGAHELA	
GENESEE OHIO	
2. DESCRIRE THE EXACT POINTISI OF DISCHARGE:	
39 DEG. 49 MIN. 10 SECTLATITUDE	
75 DEG. 24 MIN. 30 SEC. LONGITUDE	
A. WATERSHED AREA ABOVE POINT OF DISCHARGE IS	
N.A. SQUARE MILES.	
•	
3. WHAT IS THE:	
A. MINIMUM 7-CONSECUTIVE-DAY FLOW OCCURRING ONCE IN 10 YEAR 37	
N.A. CUDIC FEET PER SECOND	
taken in Feb, 1976 for Marcus Hook Creek show average flow of 3	cfs
ATTACH A U. 3 GEOLOGICAL SURVEY 1.5" OR 15" QUADRANGLE MAP SHOWN 3 EXACT POINTIN OF DISCHARGE.	
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6-30-76

WATER POLLUTION CONTROLS MODULE 2 - GENERAL INFORMATIONS INDUSTRIAL WASTES

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Forellandingent Use Only ARAL	•
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SECCIVING STREAM - CONTINUED	
C. FLOWS IF ROM IT LNS 3.A. AND 3.8.) ARE BASED ON [3] MEASURE	
D. IF STREAM COES DRY, FOR HOW MANY DAYS PER YEAR? N. 1	1.
R. IS THE TREATMENT PLANT SUBJECT TO FLOODING?	Yes X No
. THE PROBABILITY OF THE TREATMENT PLANT, BEING OUT OF, SERVICE	
DUE TO FLOODING IS ONCE IN N.A. YEARS.	•
A. LIST BRIEFLY THE METHODS USED FOR FLOOD PROTECTION:	•
. TO THE BEST OF YOUR KNOWLEDGE, WILL THE TREATED WASTE DISC ADVERSELY AFFECT:	HARGE
A. DOMESTIC WATER SUPPLY?	☐ Yes ☐ No
B. BATHING?	Yes X No
C. STOCK WATERING?	Yes X No
D. FISH AND AQUATIC LIFE?	
E. INDUSTRIAL WATER SUPPLY?	∐ Yes ∐ No
F. IRRIGATION?	Yes X No
G. BOATING AND AESTHETICS?	Yor [X] No
H. POWER AND NAVIGATION?	Yes X No
, IF ANY ITEMS IN 6 ABOVE ARE ANSWERED YES, INDICATE LOCATION A EXTENT OF ADVERSE EFFECT.	C 4A
N.A.	

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DEPARTMENT OF ENVIRONMENTS OF HEGOURCES WATER QUALITY MANAGEMENT

WATER POLLUTION CONTROL
MODULE 2 - GENERAL INFORMATION
INDUSTRIAL WASTES

ORIGINAL (Red)

G. PROCESS WATER - CONTINUED TABLE II AVERAGE WATER USE SOURCE NAME (MGD) PUBLIC SUPPLY (INDICATE PURVEYOR N.A. & WATERSHED! WELLS N.A. RIVER, STREAM, OR LAKE Delaware River 120.72 OTHER (SPECIFY) N.A.

H. SEAL AND SIGNATURE OF PROFESSIONAL ENGINEER OR SURVEYOR RESPONSIBLE FOR THIS APPLICATION

Not responsive due to revised scope

1. SIGNATURE OF PROFESSIONAL ENGINEER
(Or Surveyor Where Permitted By Law)

2. SEAL OF PROFESSIONAL ENGINEER
(Or Surveyor Where Permitted Jy Law)



					For Ospinon-n (Red)	Ooty
		MODU	LE 4 - WASTE LOAD	AND CHARACTERISTIC		• • • • •
		•			0 0	0.00
LVD	E I – WASTE STATE	JS REPO	nt ·			
TOTAL WASTE FLOW IMGU)			sounce of waste: Rainfall Surface Runoff	API Separator	SOURCE OF WASTE:	SOUNCE OF WASTE:
		•	X FUTURE	X PRESENT FUTURE	PRESCRT FUTURE	PRESENT FUTURE
	YI C OF WASTE			Process Waste Water Overflow		
FLOW N	A. MGD (AVERAGE B. MGD (MAXIMUN		N.A. Design Storm 2"/hr./lhrs 23	0 10.5 During Design Storm		
3. 90£	A, TREATED SEPARATELY		-			
DISCHARGE	R. NOT TREATED	STING		4,		
W/.S	C. COMBINED CHA DETABRE	UNIT FRO	Yes	Yes		
100	API Separat Sand Filter Activated	orX X	X X X	X X X		
TREAT	Carbon			· ·		
A GENERAL INFORMATION 1. WILL ALL LABORATORY ANALYSES BE IN ACCORDANCE WITH THE LATEST EDITION X YM NO NA						
2.	2. WILL THE TREATMENT PROCESS PRODUCE FOR EACH WASTE ABOVE A SATISFACTORY X YOU NO NAME OF THE PROCESS OF THE P					
İ	ONLY SEIVERAGE AND INDUSTRIAL VASTE APPLICANTS COMPLETE ITEM 3. 3. GIVE EXPECTED PERCENTAGE REDUCTION OF: A. BOD (5 DAY 20° CENTIGRADE) N.A. *					
S. GIVE EXPECTED PERCENTAGE REDUCTION OF:				D. SUSPENDED SOLIDS	N.A.	× 🔲
				C. SETTLEABLE SOLIOS (SELVAGE ONLY)		* 🗆

WATER POLLUTION CONTROL

MODULE 4 - WASTE LOAD AND CHARACTERISTICS	WATER POLLUTION CONTROL

								_	
Sample or Data Location — Continued	WASTE: SUT	infall face Runo		er Overf	WASTE:		WASTE:		
		ing Pond Influent	API Sepa	rator Effluent)	LOCATION:	;	LOCATION:		
INDUSTRIAL WASTE APPLICANTS COM- PLETE ALL APPLICABLE ITEMS.	X FUTUR		X PRESEN		PRESEN	•	PRESENT		
SEWAGE APPLICANTS COMPLETE ONLY		Load		Load	Waste	Load	V:	Lord	
	N.ny	Treated	Bay	Tracted	Raw	Treated	Raw	Treated	
MINE DRAINAGE APPLICANTS COM- PLETE ONLY ITEMS CODED "M,"	X Est.	Actual Est.	X Actual	Actual Est.	Actual Cst.	Actual Est.	Actual Cst.	Actual Est.	
								L., *\\.	
18. DISSOLVED OXYGEN Mg/L		5	0.5	S		s		S	
12. TUHSICITY Units		S M		S-M		S-M		5 - 1.1	
70 MITROCEN - AMMONIA MOL	<u>s</u>	5	<u>s_3</u>	S	s	5	S	s	
21. WIRCOSM - NITRITE MAKE 22. NITROSEM - NITRATE MAKE		5		<u>s</u>	<u> </u>	s		S	
23. PROSENATE MOLE 23. PROSENATE MOLE (TOTAL SOLUBLE PO ₄)	5	<u>s</u>	s 0.3	S .	3	<u>s</u> S	ŝ	S	
24 SULFATE Mg/L	tA.	M	M	M	M	M	14	<u>.</u>	
25, Oil Mg t	35.8		55						
COD Mg/L TOC Mg/L Sulfide Mg/L Phenol Mg/I	35 31.8		475 160 2 1						
				. 1		•		. • •	

B. DESCRIPTION OF SAMPLING PROCEDURE

1. FOR EACH WASTE LOAD ON TABLE II, DESCRIBE BELOW THE METHOD AND DATE(S) OF SAMPLING.

Surface Runoff - Grab samples taken during periods of surface runoff in the winter of 1975 and spring of 1976.

Waste Process Water - 24 hour composite samples 2 weeks in Feb. 1976 and 1 week in April 1976
Grab samples taken three times a week during 1975-1976.
Actual waste load characteristics of the Waste Process Water Overflow will be lower than that shown due to the fact that overflows occur due to rain storms which increase plant flow and consequently dilute the waste load.

TABLE II - WASTE LOAD CHARACTERIS	7103								-	9.6
			AVERAG		·	 	,		11	130 M
Sample Or Data Location	WASTE: Sur	nfall face Run- unding P.	Waste P waste:Wate flow(API	r Over-	WASTE:		WASTE:			30/76
· ·	LOCATION: I	nfluent	LOCATION: E	ffluent)	LOCATION:	<u> </u>	LOCATION:			
INDUSTRIAL WASTE APPLICANTS COM- PLETÉ ALL APPLICABLE ITEMS.	X PHESE		X PRESEN	•	PRESEN	•	PRESEN		MODULE	
SEWAGE APPLICANTS COMPLETE	Waste	Lord	Viario	Load	Wasta	Load	¥+2514	Loid	[F. 4	§ ;
ONLY ITEMS CODED "S."	Row	Treated	Raw	Treated	Raw	Treated	Raw	Treated] ;	TAW
MINE DRAINAGE APPLICANTS COM- PLETE ONLY ITEMS CODED "M."	Actual X Est.	Actual Est.	X Actual Est.	Actual Est.	Actual Est.	Actual Est.	Actual Est.	Actual Est.	WASTE LO	ER POLL
1. WASTERLOW . Mgd	s 23 Design	S M	TOverflo	s W	S M	S M	3 M	S M	8	יודא ^א רודא א
2. COLOR	Storm			·		<u> </u>		·	Ş.	O F
2. TEMPERATURE Day F			95°-115°		ļ. 	ļ	ļ	 	1	က ရှိ
4. pH	S M 7	S M	S M 6-7	S M	S M	S M	S M	S .	CHARACT	CONT
5. ALKALINITY Mo/L (Minus for Acid)	S 1.1	S M	s M 60	S . M	S M	S M	S M	s v	CTE	בה הַ
6. SOCIUS - SUSPENDED Mª/C	3 M. 24.5	s м .	s · M 77	S M	S. M	s M	S M	S M	ERISTICS	
7. SOURDS-DUD I CALD CONCENSED,	, D	2	s N.A.	5	S	S	<u> s</u>	S		
8. SCHIDS - SUSPENDED LEWDay	S M	S	s M 1850	S M	S M	S M	S At	S M	,,,,,	1
9. SOLIOS - SETTLEAULE MIZE	S M	3 M	s 0.1	S M	S r.n	S M	5 M	S M	30,72	Ŷ
TO SOLIDS - DISCOUVED Mg/L	м	2.1	1.1 440	M	M	М	1.1	M		100
11. ISON - DIESOLVED MOR	2.1	M	M Neglig	ible	м	54	*4	м	1,4,2	ORIGINAL
12. TROSECTURAL Mark	1	1.5	7.4	2,1	1.5	1.4	1:4	M	1 1 2	RIGINAL
13 MATHAMESE MOTE	М	! : 1	1.5	5.1	1 :-1	6.1	13.1	1:4	1. 00	
14 ALUMANUM Ma/L	•.1	1.1	1.1	\ <u> </u>	h.!	M	<u> M</u>	1.1	1. 1	1
15. (6:17) Mart. (5:05.4.49) CI	21		100	>	S	s	s	5] .	•
16. EUC Lbs/Cap/Day (5. Day 26 ² C)	s N.A.	ម	s N.A.	3	s	s	S	s		•
17. E.J.) LOS/Uay	s	s	s 2400	3	s	s	s	S	· ·	∤

			•
_		7	
h	21–'	/ h	
	<u></u>		
DAIL	D. C		
UNIC	M C A I) I. U	

WATER QUALITY MANAGEMENT .

WATER POLLUTION CONTROL MODULE 5 - GEOLOGY AND

ORIGINAL (Rein)				-
or Dergiment Uif Only :	•	:	•	•

		GROUND WATER INFORM	<u> </u>		
			IMPOUNDMENT	IMPOUNDMENT	IMPOUNDMENT
	•		EXISTING PRIOPOSED	EXISTING PROPOSED	EXISTING PROPOSED
1.	A. TOTAL AVAIL	AULE ACHEAGE OF JITE	2.3		
	B. TOTAL ACREA	GE UTILIZED .	2.3'		
2		(1) NEAREST OC JUPIED DWELLING(S)	1,000 :	,	
LOCATION	C. DISTANCE (FEET)	(2) NEARESTSTHEAMOR SPRING	40 j		
20	T O	(3) NEAREST WELL(S)	About (b)(9) in upper Ch	ichester.	
	IWLOANDWEN	TOPOGRAPHIC MAP "NCLOSED SHOWING T LOCATION, PROPERTY BOUNDARIES, THROUGH C ABOVE?	X Yes No	Yes No	Yes No
2.	A. INDICATE TYP	E OF FACILITY AND PROCESS PRODUC-		ond for Gene	
	1.		Processed Wa	Overflow of ste From Sur rm Water Con	ge
5:45TE					
	B. EXTENT OF	(1) HOURS/DAY	· -		
	SITE USE	(2) DAYS/WEEK	Average of		
	C. VOLUME (MG	O OR CU. FT: DAY)	See Mod. 4	Waste Load 1	low
ο.	A. TYPE OF LITH	OLOGY (Sancistone, Shale, Limostone, etc.)	Gneiss	·	
בסשפבע	B. DEPTH (FT.)		5 to 34		
023	C. DIP		Varies 20 to 130		
	D. FRACTURING	JOINTS OA FAULTS	Decomposed upper 10'-2	in O', weather	d below.
4.	A. SOIL SERIES (Soll Conservati	on Service Cl. isilication)	Slackwater deposits po the Wehadko Silt Loam	ssibly	
\$0:13	D. THICKNESS OF	t. To-Hedrock ¹	5 to 24		
ន	C. DEPTH TO HIG OR HARDPAS	SHEST MOTTLING, FRAGIPAN (FI)			
		INHACTERISTICS In Survice Classification)	poorly drained		

ER710.046.5

DATE PREPARED

DATE REVISED

10/12/76

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES WATER QUALITY MANAGEMENT

WATER POLLUTION CONTROL MODULE 5 - GEOLOGY AND GROUND WATER INFORMATION

9	• • • • • • • • • • • • • • • • • • • •	9	ORIG (Re	''6T/T&.	•	•		•
For	Depart	tment	Use On	ly		_	_	

	_	GROUND WATER INFORMA	ATION		
5.	A.	DEPTH TO HIGHEST GROUND WATER TABLE (Ft.)			
		· · · · · · · · · · · · · · · · · · ·		·	
	В.	(1) CHEMICAL			
VATER	QUALITY		·		
GROUND WATER	aua				
5		(2) BACTERIOLOGICAL	·		
:	C.	DIRECTION OF MOVEMENT			
	D.	WHAT IS THE PRESENT USE OF GROUND WATER WITHIN A ONE-HALF MILE RADIUS OF IMPOUNDMENT(S)?			
3ORINGS .9	Α.	ARE LOGS OF BORINGS TO DEPTH OF 25 FEET EN- CLOSED GIVING LOCATION AND DESCRIPTION OF ITEMS 3 THROUGH 5 ABOVE? (These are required if information is not otherwise available.)	Yes No	Yes No	Yes No
BOR	В,	IF REQUIRED, IS MONITORING WELL INSTALLED AND LOCATION GIVEN?	Yes	Yes No	Yes No
7. Sp		HOW WILL SIDES AND BOTTOM BE CONSTRUCTED SO AS TO BE IMPERVIOUS? BRIEFLY DESCRIBE: The slurry cutoff wall vibrating-beam injection method.	pumped under the underlyin	slurry mixture controlled pre g strata to a erlying rock)	ssure through
LAGOONS	В.	WITH WHAT WILL SIDES AND BOTTOM BE LINED?	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	e injected (con
PONDS OR LA	c.	WILL SURROUNDING AREAS BE GRADED TO PREVENT SURFACE WATER FROM ENTERING LAGOON?	XX Yes No	XX Yes '	XX Yes No
.		ARE THE IMPOUNDMENTS IN AN AREA THAT HAS BEEN DEEP MINED?	Yes XX No	Yes XX No	Yes XX No
	Ε.	IS THERE ACTIVE SINK HOLE DEVELOPMENT IN THE AREA?	Yes XX No	Yes XX No	Yes XX No
8. SNOI		LL THE SITE ALSO BE USED FOR SANITARY LANDFILL, RIGATION, OR OTHER LAND DISPOSAL OPERATION?	Yes	Yes No	Yos No
ER OPERATIONS	Α.	IF YES, HAS THE OPERATION BEEN APPROVED BY THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES?	Yes No	Yes No	Yes No
ОТНЕВ	В.	SPECIFY THE NAME OF PARTY OPERATING THE LAND FILL AND/OR DISPOSAL OPERATION.			
	c.	IF PERMITTED, GIVE PERMIT NUMBER.			



- 7. A. vertical slurry insertion will also overlap the previous insertion. These two factors shall insure a continuous and impervious vertical wall surrounding the impoundment basin. To prevent uncontrolled seepage from the bottom of the impoundment basin, the slurry wall will be terminated at the top of the impervious rock underlying the basin.
 - B. into the earthen embankment which will form a continuous impervious vertical wall surrounding the impounding pond. The slurry will consist of a stable colloidal suspension of pulverized natural sodiumcation bentonite, cement and other additives in water. The bentonite will comply with API Standard 13A Sections 3, 5, 6, & 7 with the following exceptions:
 - a. Elimination of the yield point plastic viscosity relationship.
 - b. Use of 28 grams of clay instead of 22.5 grams.

The cement will be Portland Cement ASTM C150 Type 1 or 1-S.

The vertical slurry wall will be injected down to the top of the underlying impervious rock which will prevent seepage from the bottom of the pond.

DATE REVISED

10/12/76

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF LIVINGOMENTAL RESOURCES WATER QUALITY MANAGEMENT AND SOLID WASTE MANAGEMENT

MODULE 5A - PHASE I SUPPLEMENTARY GEOLOGY AND GROUNDWATER INFORMATION

	• :	•	•		•••	DED CÂNAIA	
	•	• •	•	•	9	(Red)	
_		FOR () PAF	N IMTS	T USE	Cityl C	·

Α.	Will this be an all-seaso	on operation?						IJ Y	ES	: :	NC
	1. If seasonal, include		s:		tó		·				
В.	Precipitation data:	For a sanitary 1 complete 1, 2, For spray irriga For impoundme	3, 5 & 6. Ition comple	te 3, 4, 5	& 6.	atment of le	achate				
	1. Maximum precipita				inches/yr						
	 Average precipitation Maximum monthly 		e		inches/yr Month	in		•			
	4. Minimum monthly				Month	in.					
	5. Station of record 6. Length of historical	l record								•	
	3	ii record		•							
C.	Flooding Frequency										
	1. Will all or part of	the site be inu	ndated? (cl	heck one)							
	aonce in	5 years or	more								
	bonce in	'									
	c. once in d. once in										
	eonce in	100 years		•							
	fnever										
D.	Source of flooding info	rmation			·			_			
	•										
	·				· · · · · · · · · · · · · · · · · · ·	· 					
					· · · · · · · · · · · · · · · · · · ·				-		
	IPOUNDMENTS				· · · · · · · · · · · · · · · · · · ·						
	IPOUNDMENTS swer the following question	ons for impound	dments only	······································							
An					imperviou	is?		** Y	'ES		NO
An	swer the following questi	bottom of the	impoundmen	nt be made	·		ected				N
An	wer the following question. How will the sides and	bottom of the	impoundmen	nt be made	wall wi	ll be inj		into 1	the	. []	N
An	wer the following question. How will the sides and Briefly describe or expl	bottom of the ain A vertice surroundin	impoundmen al slurry g the pon	ot be made cutoff	wall wi slurry	ll be inj will cons	ist of	into d	the able	· · · · · · · · · · · · · · · · · · ·	N
An	How will the sides and Briefly describe or expl	bottom of the ain A vertice surrounding ion of pulve	impoundment al slurry g the pon	nt be made v cutoff nd. The cural soc	wall wi slurry dium-cat	ll be inj will cons ion bento	ist of	into d a stand	the able ment		NO
An	How will the sides and Briefly describe or expl earthen embankment colloidal suspension water. The slu	bottom of the ain A vertic surroundin ion of pulve arry will be	impoundment al slurry g the pontion rized nate injected	nt be made v cutoff nd. The cural social down to	wall wi slurry dium-cat	ll be inj will cons ion bento pervious	ist of	into d a stand	the able ment		NC
An	How will the sides and Briefly describe or expl earthen embankment colloidal suspens	bottom of the ain A vertice surrounding ton of pulve surry will be aid.	impoundment al slurry g the pontion rized nat injected	nt be made v cutoff nd. The cural social down to	wall wi slurry lium-cat	ll be inj will cons ion bento pervious	ist of nite a bedroc	into d a stand	the able ment eiss)	
An	How will the sides and Briefly describe or explesarthen embankment colloidal suspension water. The slunderlying the por Will the surrounding ar	bottom of the ain A vertice surrounding ion of pulve surry will be aid.	impoundment al slurry g the pontized nate injected or diked to	nt be made r cutoff nd. The cural soc d down to	wall wi slurry dium-cat to the im	ll be inj will cons ion bento pervious from enter	ist of	into dinto dinto di no d	the able ment eiss)	
An	How will the sides and Briefly describe or expl earthen embankment colloidal suspens in water. The slu underlying the por Will the surrounding ar impoundment? Briefly describe or expl	bottom of the ain A vertice surrounding ion of pulve surry will be aid. The graded of the ain The west	impoundment al slurry g the ponting the pontion injected or diked to exterior	nt be made recutoff nd. The cural social down to prevent sur	wall wi slurry dium-cat the im	ll be inj will cons ion bento pervious from enter	sist of onite a bedroc	into de la standa cere k (gna - XX Y	the able ment eiss)	
An ∙ A.	How will the sides and Briefly describe or expl earthen embankment colloidal suspension water. The slu underlying the por Will the surrounding ar impoundment? Briefly describe or expl a 4:1 slope to Hoo	bottom of the ain A vertice surrounding ion of pulve urry will be ain. The west ok Creek. A	impoundment al slurry g the pon rized nat injected or diked to exterior slight b	nt be made v cutoff nd. The cural soc l down to prevent sur c sides o perm will	wall wi slurry dium-cat to the im face water of impou	ll be inj will cons ion bento pervious from enter ndment wi structed	ist of onite a bedroc	into the control of t	the able ment eiss)	
An	How will the sides and Briefly describe or expl earthen embankment colloidal suspens in water. The slu underlying the por Will the surrounding ar impoundment? Briefly describe or expl a 4:1 slope to Hoo three sides of the	bottom of the ain A vertice c surroundin ion of pulve extry will be aid. The west ok Creek. A a pond to pr	impoundment al slurry g the pon rized nat injected or diked to exterior slight beyond sur	or be made of cutoff od. The cural social down to prevent sur c sides of perm will cface rur	wall wi slurry dium-cat to the im face water of impou	ll be inj will cons ion bento pervious from enter ndment wi structed m enterir	bedroceng the around	into the a stand cere k (gnote the content of the c	the able ment eiss)	
An	How will the sides and Briefly describe or expl earthen embankment colloidal suspens in water. The slu underlying the por Will the surrounding ar impoundment? Briefly describe or expl a 4:1 slope to Hoo three sides of the	bottom of the ain A vertice surrounding ton of pulve surry will be aid. The west ok Creek. A per pond to pr	impoundment al slurry g the pon rized nat injected or diked to exterior slight here.	on the made of cutoff and. The cural social down to prevent sure cutoff sides coperm will create run	wall wi slurry dium-cat to the im face water of impou	ll be inj will cons ion bento pervious from enter ndment wi structed m enterir	bedroc ing the around	into the a stand cere k (gnote the content of the c	the able ment eiss 'ES d at)	
An A. B.	How will the sides and Briefly describe or expl earthen embankment colloidal suspens: in water. The slu underlying the por Will the surrounding ar impoundment? Briefly describe or expl a 4:1 slope to Hoo three sides of the Will the sides be construyove action?	bottom of the ain A vertice surrounding ion of pulve arry will be aid. The west ok Creek. A per pond to producted to maintain aid.	impoundment al slurry g the pon rized nat injected or diked to exterior slight between t sure a two (2)	or be made or cutoff od. The cural social down to prevent sur c sides of perm will cface rur	wall wi slurry dium-cat to the im face water of impou l be con noff fro	ll be inj will cons ion bento pervious from enter ndment wi structed m enterir	bedroc ing the around ing the	into the condition of t	the able ment eiss 'ES d at) r	N

DATE REVISED	MANUELL FOREOTION COMMITTEE
	MODULE 8 - PUMPING FACILITIES

For Deposiment Use Only DOMINAL

TABLET - LIST ALL THE PURPOS IN THE PACIETY CLASSIFY EACH PUMP ACCORDING TO THE CLASSIF & CATINNEL PANCES.

Impound Pond API				ANSWEIL	ALL HELLY	ANT OUESTION	¥5.									•	• •				
2 G Underdrain 18 ing Pond 2.5 X X X X X 100 22 4440 3800 N. 2 H Sump 9.5 Separator 3.2 X X X X X X 500 50 4870 4300 N.					WASTE PUR	14				Th	101	∧թբ	Ν						· Or		
2 G Underdrain 18 ing Pond 2.5 X X X X X 100 22 4440 3800 N. 2 H Sump 9.5 Separator 3.2 X X X X X 500 50 4870 4300 N.		OF IDENTICAL PL	ICATION KEY By Letter)	D. SLUC E. EFFI F. MINE G. OTHI H. Voct	DGE RECIRC LUCHT PUMF C DEWATERI ER Sühmer Tau I Nam	ULATION PUMP This Sump for the	Pump - Pump		a	נ אונט	41 SP4 CD	TIC CONTROL	CORTION	FICT M CTOR	Y OPENATION			APACITY L.)	VE CAPACITY L.)	ION PERIOD	
2 H Sump Pond AP1 Separator 3.2 X X X X X X 500 50 4870 4300 N.		NOV.3EA	CLASSIFI IIndicate (POINT OF SUCTION	SUCTION HEAD (FT.)	POINT OF DISCHARGE	VELOCITY (FPS.)	EXISTING	PHC+OLF	VARIABLE	COMPLEM	AUTORIA	TWEETER	Prit COM	STABILITY	(GPM.)	TDH (FT.)	TOTAL C	EFFECT!	DETENT	
2 H Sump 9.5 Separator 3.2 X X X X 500 50 4870 4300 N.		2	G			Impound- ing Pond	2.5	_	х		Х	Х			х	100	22	4440	3800	N.A.	
		2	Н				7 3.2	-	X		X	Х	_		x	500	50	4870	4300	N.A.	
	-												_								
	-	+		•							_		_	_							
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	-	-							<u>! _ </u>							·					
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								_	-					 							

6/30/76	
DATE HEVISED	_

WATER POLLUTION CONTROL MODULE 9 - FLOW EQUALIZATION AND STORAGE BASINS

•
SOPICIRIAL "
(Red)

7		Andre de la companya								
7/	COMPLET	INDICATE FUNCTION TE ALL APPLICABLE INFORMATION	UNITEXISTING	UNIT E XISTING PROPOSED Storage of: Untreased Watter Treated Waste Water	EXISTING PROPOSED Storage of: Uniterated Waste Water Treated Waste Vizier					
-		THIS UNIT FROM: (Indicate Unit) APT	Consentant C D							
		THIS USHT FROM: (Indicate Unit) APT	peparator & Ra	infall Surfac	e Runoff					
اسا	. CONCRETE									
20	r woon									
SA	C. STEFL									
14 P	U. FARTHEN	Excavation, Diked)	X							
V	20 (1) ms	IDE SLOPE (Vers.: Poriz.)	1: 4 & 1:3	1:	1:					
12 ×	1245	TSIDS 3LGPS (Vertitions)	1: 4 ; Flat	1:	1:					
¥ΰ	₹ <u>5</u> 0 -	RM WIDTH (Ft)	20							
2.	A. LENGTH	(Ft.)	315							
	b. WIOTH	(Ft.)	225							
	c. OR DIAMET	·	N.A.							
m X.										
ENS'O	d. DEI'TH (1)	NORMAL OPERATING DEPTH (Ft.)	N.A.							
10 X	(5)	MAXIMUM AVAILABLE DEPTH (Ft.)	<u> </u>							
2,4	u. FREEBOAR	D (Ft.)	2.0							
3.		(1) HORMAL OPERATHIS CAPACITY (Gel.)	N.A.							
	r. CAPACITY	(2) TOTAL	COMPUTE THE TOTAL	FOR ALL WRITS HERE.						
	·	(3) MAXIMUM AVAIL / BLE CAPACITY (Gal.)			A DECEMBER OF THE PROPERTY OF					
¥			N.A.		•					
DAT	b. DETEN-	(1) AVERAGE (Hrt.)			······································					
NO.		(2) MAXIMUM (Hrs.)	6.5 days							
25.0	C.DISCHARGE	(I) FLOW Gal per Design Storm	1,398,000							
	10 0	(2) DURATION (Frs./Dev)	N.A.	· · ·	· 					
7	d.DISCHARGE	(1) FLOW (MGD)	0.72;1.44	Average:maxim	num					
	FROM URIT	(2) DURATION (HM/Day)	24 -							
^	Pumped discharge to API separator. Impounding pond pumps are manually started and interlocked with the inderdrain sump pumps to safeguard the pond lining. Emergency overflow to Marcus Hook Creek.									
	2. HOWWILE SEDIMENT ACCUI ULATION IN THE UNIT BE MINIMIZED? Periodic cleaning									
		FACE WATER BE D VERTED FROM THE D		Yes	X ***					
	4. WILL SIDE	S DE PROTECTED AGAINST WAVE ACTIO	,	X Y,	\					
	KOTE: COM	CLETE APPROPRIATE PORTIONS OF MODE	JLE 5 IF AN EARTHEN I	BASIN IS USED.						

IMPOUNDING POND

SECTION 2AG

	<u>Title</u>	Page
2AG.1	General	2AG-1
2AG.2	Materials	2AG-1
2AG.3	Site Preparation	2AG-2
2AG.4	Unclassified Excavation	2AG-2
2AG.5	Drainage	2AG-3
2AG.6	Placement of Materials	2AG-3
2AG.7	Compaction and Moisture Control	2AG-4
2AG.8	Settlement of Embankment	2AG-5
2AG.9	Alternate Pond Liners	2AG-5

2AG.1 General. The Contractor shall provide all materials, labor, tools, and equipment necessary, and shall construct the impounding pond, as indicated on the drawings, as herein specified, or as directed by the Engineer, when required.

As part of the progress schedule, the Contractor shall, prior to starting work and from time to time during its progress, prepare a schedule and outline the methods he plans to use in doing the work.

<u>2AG.2 Materials</u>. All soil material to be used in the construction of embankments, fills, and slopes for the impounding pond shall be as follows:

Modified Bank-Run Gravel: See Bank-Run Gravel (Section 2E), except as follows:

Maximum size:

Drainage Blanket and Cover Layer - 1 in. max. size All other Zones - 3 in. max. size

Maximum 10 percent passing a number 200 sieve

Admixture: Volcanic ash bentonite (to be added to drainage blankets and cover layers)

Clay Liner & Clay Cutoff Wall: Inorganic, natural soil, free of plant growth, roots, and humus. Maximum 1/2 in. size classified as CL in accordance with ASTM Standard Method for Classification of Soils for Engineering Purposes, Designation D2487-69

Cover Layer: Same as for Drainage Blanket

Samples of modified bank-run gravel and clay fill shall be submitted for approval 21 days prior to use as directed by the Owner. Preferably, one borrow source of modified bank-run gravel fill shall be allowed for the drainage blanket and preferably one source for the cover layer. If more than one borrow source of modified bank-run gravel fill is used, samples of the material from each source shall be submitted for approval 21 days prior to use, as directed by the Owner. After borrow source has been approved, at least two days notice must be given to the Owner before the new borrow is used. The Engineer shall be present during all sampling of borrow materials.

The material to be used for the admixture to the modified bank-run gravel, as indicated on the drawings and where directed by the Engineer, shall be a volcanic ash bentonite clay known as Saline Seal manufactured by the American Colloid Company, Skokie, Ill., or equal.

The admixture proposed for use shall be submitted to the Owner for approval prior to shipment to the job site. A 100 lb. sample shall be submitted at least 21 days prior to use, as directed by the Owner.

<u>2AG.3</u> <u>Site Preparation</u>. The Contractor shall do all site preparation necessary to properly allow for construction and completion of the impounding pond and related facilities. All work shall be done in accordance with the requirements specified under SITE PREPARATION and as herein specified or as directed by the Engineer.

2AG.4 Unclassified Excavation. The Contractor shall make all excavations necessary for the construction of the impounding pond, as indicated on the drawings, as specified herein, and as directed by the Engineer. The Contractor shall control his operations to prevent any instability or movement of the existing and proposed embankments.

The slopes for the existing sludge pond are marginally stable and instability may occur during excavation. The Contractor shall stage his construction operations, including excavation and backfilling, to prevent weakening or instability of the existing foundation and embankment soils. Slope failures of the pond embankments have previously occurred and excavation of this material shall be as directed by the Engineer.

The unclassified excavation shall consist of, but not be limited to, sludge, organic soils, unstable slope soils, and other excavations necessary for the impounding pond construction.

All excavated materials shall be removed from the construction site and disposed of by the Contractor, at his expense, at appropriate locations within refinery limits as approved by the Owner.

ORIGINAL (Red)

2AG.5 Drainage. To ensure proper conditions at all times during construction, the Contractor shall provide and maintain facilities to intercept and remove promptly and dispose properly of all surface and groundwater and other liquids entering all excavations. Such excavations shall be kept dry during placement of all fill. All work shall be in accordance with subsection titled "Drainage" under EARTH EXCAVATION, BACKFILL, FILL AND GRADING and as herein specified.

A drainage blanket shall be placed as indicated on the drawings. Sump pits shall be set in the drainage as necessary to control the water level in the blanket. Pumps shall be used to maintain the water level a minimum of 12 inches below the surface of the blanket.

2AG.6 Placement of Materials. As specified above, a drainage blanket shall be placed as indicated on the drawings. The drainage blanket shall be placed in one entire lift which is 18 inches in thickness. Where unsuitable or unstable soils are removed below the lower limit of the drainage blanket, these areas shall be backfilled in accordance with procedures and materials for the drainage blanket. For modified bank-run gravel placed in embankments, the layers shall not exceed 8 inches in thickness before compaction. After the drainage blanket is entirely installed throughout the impounding pond area and the water level is lowered as noted above, an 8 inch diameter asphalt-coated corrugated-metal perforated underdrain pipe shall be placed as indicated on the drawings.

Next the bentonite admixture shall be applied at rates as determined by the Engineer. The admixture rate will be approximately between 8 to 15 percent weight. The admixture shall be applied to a loosened 8 inch layer of the drainage blanket. Any reasonable method of spreading will be acceptable if it results in a uniform distribution of the admixture at the specified rates. After the admixture has been uniformly placed and spread, the loosened layer shall be thoroughly mixed by scarifying, disking, and harrowing. Thereafter, the drainage blanket shall be compacted as specified hereinafter.

The Contractor shall provide a sufficient stockpile or nearby source of supply of bentonite so there will be no delay between when the admixture rate is determined by the Engineer and when admixture has to be used in the field.

The clay liner and clay cut-off shall be applied in a uniform . 6 inch layer as indicated on the drawings. Compaction shall be as specified hereinafter.

A six-inch cover layer shall be installed over the clay liner as indicated on the drawings. The bentonite admixture shall be applied and construction procedures shall be as previously

specified for the drainage blanket. A minimum of l inch of fresh water should be allowed to contact all areas treated with the benonite admixture to effect prehydration. After 4 days of contact with the fresh water, the impounding pond can be put in service.

2AG.7 Compaction and Moisture Control. All materials placed for the drainage blanket, clay liner, and clay cutoff wall and cover layer shall be compacted to 95 percent of maximum density as determined by Method D of ASTM Standard Methods of Test for Moisture-Density Relations of Soils using 5.5 lb. (2.5 kg) Rammer and 12-inch (304.8 mm) Drop, Designation D698-70. Modified bank-run gravel placed in embankments and all backfill in pipe trenches and around structures shall be compacted to 95 percent of the maximum density specified above.

Compaction shall be carried out by using equipment that will attain the required compaction without disturbing the existing soils. The existing soils are generally very soft fine-grained soils such as silts and clays which could be disturbed by construction activities.

The Contractor shall submit to the Owner for review and acceptance, the name of a qualified reputable independent soil testing laboratory. All field and laboratory soil tests to determine compliance of fill and backfill materials with specified requirements and to determine compliance with specified compaction requirements will be paid for directly by the Owner. The Contractor shall schedule and make arrangements for all field and laboratory soil tests with the laboratory. The Contractor shall have the laboratory submit to the Owner, as a part of the bid submittal, a fee schedule listing the prices of all soil testing, including but not limited to the following:

- a. Field density tests (sand cone and nuclear density equipment).
- b. Proctor tests.
- c. Hydrometer.
- d. Washed gradation.
- e. . Specific gravity.
- f. Atterberg limits.
- g. Water content, etc.

The Owner reserves the right to change the laboratory at any time. The testing laboratory shall submit copies of all soil

test results and soil inspection directly to the Owner and also directly to the Contractor. Preliminary copies of all field tests shall be submitted to the Owner before the testing laboratory representative leaves the site.

The control of moisture during compaction, including those areas to be compacted after adding the mixture, will be based on the results of the compaction test as stated above. All materials shall be compacted at moisture content within two percent of the optimum moisture content as determined from the compaction test. Should the materials at the time of placement or compaction be of such moisture content that the above moisture criteria are not met, then immediate steps shall be taken to dry or wet the material, as the need may be, to bring the moisture content within the specified range.

2AG.8 Settlement of Embankment. The amount of settlement of the foundation of the impounding pond embankment during construction due to the weight of the embankment fill is anticipated to vary widely over the project from being essentially negligible to a possible 18 in. in some areas of the west embankment. Some of the settlement of the embankment is anticipated to occur during construction. The material that must be added to the fill to compensate for settlement of the foundation during construction will be paid for under the appropriate bid item(s).

2AG.9 Alternate Pond Liners. The Contractor shall submit bids for three alternates, defined as A, D and C.

The pond liner for Alternate A is as indicated on sheet C-5 of the drawings.

The pond liner for Alternate B is as shown in Appendix A, and consists of a 12-in. clay liner underlain by 18 in. of drainage blanket (modified bank-run gravel). A bentonite admixture shall be applied to the upper 8 in. of the drainage blanket in accordance with placement and compaction requirements of 2AG.6 and 2AG.7. The material to be used for the admixture to the modified bank-run gravel shall be a volcanic ash bentonite clay known as Aquagel manufactured by the National Lead Company or approved equal. The clay liner shall meet the material requirements of 2AG.2 and compaction requirements of 2AG.7.

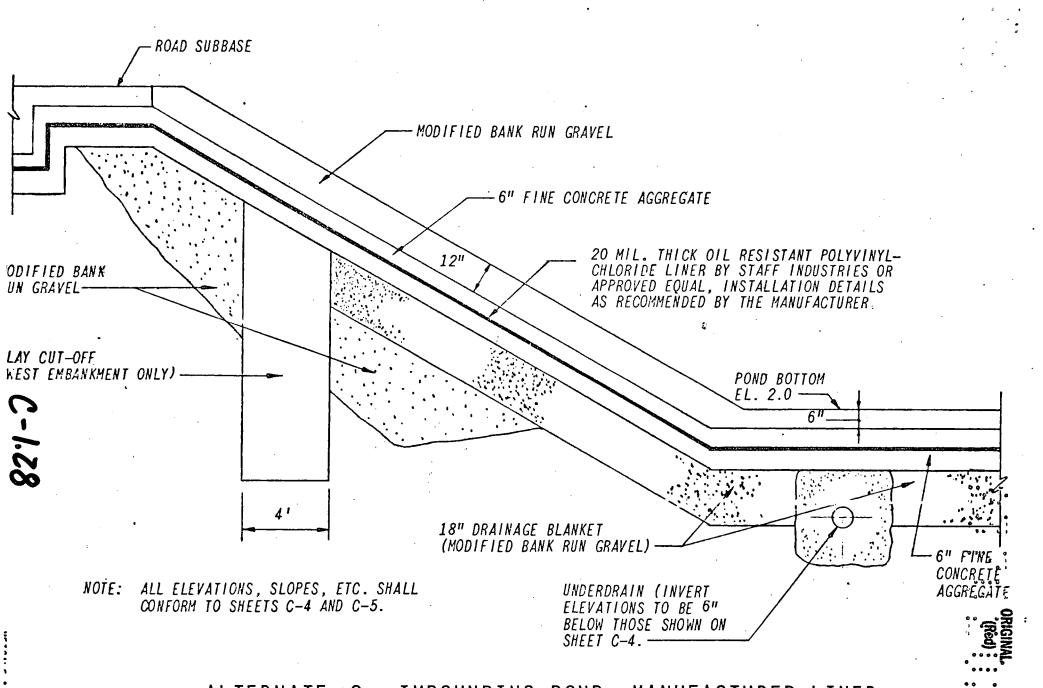
The pond liner for Alternate C is as shown in Appendix A. The manufactured liner shall be installed in accordance with the manufacturer's recommendations. After the manufactured liner is installed, no construction equipment will be allowed to pass over the liner. The fine concrete aggregate shall conform to the requirements of fine aggregate specified under CONCRETE MASONRY.

Any liner used shall not deteriorate when subjected to the following chemicals or components which may be present in the stored pond liquid at any given time:

<u>Item</u>	Parts per million (maximum)
Sulfide	300
Phenol	15
ин3-и	10
Oil	55
рН	6.0 to 10.0
Temperature	115 deg. F
Total dissolved solids (NaCl)	1,200

* * *

ALTERNATE B - IMPOUNDING POND -CLAY LINER TYPICAL SECTION



ALTERNATE C - IMPOUNDING POND - MANUFACTURED LINER
TYPICAL SECTION

EDWARD H. RICHARDSON ASSOCIATION INC.

CONSULTING ENGINEERS . LANDSCAPE ARCHINESTS





GENERAL OFFICES: RICHARDSON BUILDING • 910 SOUTH CHAPEL STREET • NEWARK • DELAWARE
MAIL ADDRESS: P.O. BOX 675 • NEWARK • DELAWARE 19711 PHONE (302) 738-7551

March 18, 1976

LIST OF TEST BORING B. P. PLANT

Test Bore Number	Coord	nates	Elevation
1	N 2034.06	E 1294.84	16.1
2	N 2034.13	E 1490.61	17.6
· 3	N 2040 <u>+</u>	E 1700+	18.0
4	N 2137.17	E 1913.31	12.9
5	N 2135.64	E 1815.15	12.0
6 7	N 2117.23	E 1599.59	16.2
7 .	N 2146.41	E 1412.25	16.6
8	N 2187.30	E 1570.04	16.3
9	N 2284.80	E 1695.83	13.0
10	N 2800.29	E 1914.23	16.3
11	N 2365.25	E 1745.42	13.7
12	N 2375.08	E 1517.76	10.4
13	N 1912.07	E 1295.77	7.6
14	N 1917.70	E 1521.40	7,8
15	N 1857.32	E 1279.36	12.8
16	N 1862.99	E 1378.64	11.0
17	N 1861.25	E 1522,59	10.3
18	N 1814.53	E 1352.60	1.9±
19	N 1798.15	E 1535.16	6.20
20	N 1747.75	E 1285,92	12.10
21	N 1754.67	L 1586.34	15.6
22	N 1665.04	E 1294,36	11.6
23	N 1935+	E 1660+	
24	N 1680,68	E 1354.48	1.9±
25	N 1664.17	E 1514.76	1.9 <u>+</u>
26	N 1605.31	E 1412.48	14.1
36	N 2330+	E 1615+	-
38	N 2500.08	E 2021.18	24.2
39	N 2504.38	E 2077.67	24.1





OBSERVED WATER DEPTH IN FEET, BELOW EXISTING GROUND SURFACE, AT VARIOUS DATES

•				•		*	
Boring number	2-2-76	2-5-75	2-9-76	2-10-76	2-16-76	2-27-76	5-13-76
B-1	7.5			7.55	7.7	7.0	6.9
B-2				5.8	6.5	6.6	
B-3			•	9.4	4.0	7.9	6.8
B-4					2.0	1.8	
B-5					G.S.	0.8	بند د ا
B-6		6.5 C.I.					
B-7	7.8	7.8	-	6.2	7.5	7.3	
B-8				7.9	7.6	7.2	
B-9			4.0	3.7	4.5	3.7	
B-10				•	4.5	3.7	0.2*
B-11				2.4	1.8	1.8	
B-12			·	4.6	2.9	3.0	5.7
B-13		G.S.		G.S.	G.S.	G.S.	
B-14				G.S.	G.S.	G.S.	
B-15		5.8		5.9	6.1	6.0	
B-16				4.0	4.4	4.1	
B-17		•		G.SC.I.		G.S.	
B-18							
B-19	•	•		0.5	G.S.		
B-20		3.9		4,5			
B-21					9.0	8.5	
B-22		3.9		4.1	4.3	5.3	
B-24							
B-25			•				

Observation well may be plugged.

OBSERVED WATER DEPTH IN FEET, BELOW EXISTING GROUND SURFACE, AT VARIOUS DATES (Continued)

Boring number	2-2-76	2-5-76	2-9-76	2-10-76	2-15-76	2-27-76
B-26		2.5		2.8	4. ?	3.1
B-38	·				6.0	5.7
B-39						

NOTE: G.S. = Ground surface. C.I. = Cave-in.

301

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

FOUNDATION TESTING and SOIL SAMPLING RECORD

AME:	Metcalf & Eddy, Inc.				LOCATI	on: Marcus H	ook, Pa.				
OLE NO.	SURFACE ELEVATION	R	16 NO	_DATE:	1	From <u>1/28</u>	то	30	19	76	
	BORING LOG		SP0	ON SA	MPLE	AND CORE DATA		BL0	WS ON	CASI	NG
	DESCRIPTION OF MATERIAL			BLOWS		D=DRY U=UNDISTURB	D TETRAP	0-1		51-52	
DEPTH	Based On Samples Recovered	SAMPLE	DEPTH	PERXX.		W=WASH R+RCD	C=CORE	1 - 2		52-53	
	Plus Observation Of Material Returned Between Samples	15 8	FROM-TO	6"	ROCK	CORE RECOV'D	NO. PCS.	2 - 3		53-54 54-55	
FROM-TO	Keturned Between Samples	S Z	I L KOM — 10	SAMPLES	CORE RECOV®D	REMARAS *	'	4 -5		55-56	
			בייטיט _	L — ·				5 -6	NOT	56-57	
0'0"	Fill, clayey sand	1	1'6"	8-8	[6 - 7	70	57-58	
10'0"	to sandy clay		5'0"-	8-	· · · · ·			7 - 8	Ē	58-59	_
		2	6'6"	6-5				8 - 9	Ξ	59-60	
1010"	0 - 1 - 1 - 13		10'0"-		(140)	lb. hammer)		9-10	П	60-61	
10'0"	Sand and small	3		₩5	(300_	b. hammer)		10-11	D.	61-62	
1	gravel	4	15'0"-					11-12		62-63	
		-4	16'6" 20'0"-	1-1				13-14		63-64 64-65	
15'0"		5	21'8"	Press	18"	2" Tube Samp	۱. ا	14-15		65-65	
45'0"	Gray river silt		25'0"-			LE THUE BISHIP		15-16		66-67	
		6		2-2				16-17		67-68	
/ 5 1 0 11 :	<u></u>	_	30'0"-					17-18		68-69	
45'0" 47'0"	Gray sand, some	7		1-1		Some vege at	ion	18-19		69-70	
47.0"	swall gravel	В	35'0" - 36'6"	1- 2-3		Como venetet	•	19-20		70-71	
		1 0	40'0"-	1-	 	Some vegetat	ICH	21-22		72-73	
47'0"	Weathered gneiss	9	4116"	1-2		Vegetation	-	22-23		73-74	
"םי בכ	meadhered gherss		45'0"-	3-		2		23-24		74-75	
		10	4616"	8-22				24-25		75-76	
								25-26		76-77	
		<u> </u>	47'0"-	ļ	 	'5		26-27	ļi	77-78	
			51'0"		7"	Core		27-28 28-29		78-79 79-80	-
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			1					31-32		82-83	
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								38 - 39		89-90	
		1						39-40		90-91	!
		+			 			40-41		91-92	
		1			1			41-42	ļ	92-93	
		-	 	 	-			43-44	 	94-95	
								44-45	<u> </u>	95-95	
GRO	UND WATER PIPE	AND C	ASING LEFT	IN HOLI	E. DI	STANCE HAMMER DROP_	20 inch	45-46		96-27	
3 P (H)	HOUR DATE SIZE	AM	OUNT .	REASON		DRIVE HAMMER	300 Las.	46-47		97-99	ļ
. 41	3 um 1/29/75 PVC	-3	3 <u>0'</u> Wa	ter ob	S.	SPOON HAMMER _ Casing Size _	11.1 LBS.	47-48	ļ	98-90	
	3 am 1/30/70 2 pm 1/30/70	 				SPOON SIZE	2 1 H CH	49-49	·	99-1	
±U14						SIZE OF CORE BIT_	NX IN CH	49:50. 50:51	···	(100-101) (101-105)	
N.C. 1. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2.	assification of soil has been m	ado h	v the drill	er and h	as not h	een Na	responsive due t	<u>'l</u>	.;; :cone	#1-2112	÷. ±.
	033111Cation O1 5011 1163 DCCH III		, , , , , , , , , , , , , , , , , , , ,	III		Driller No.	responsive due l	o revised :	Jeope		

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.



B. P. Oil Refinery Property ORIGINAL

SPRAGUE & HENWOOD, Inc. scranton, PA.

FOUNDATION TESTING and SOIL SAMPLING RECORD

AME:	Metcalf & Eddy, Inc.			·	LOCATI	on: Marcus Hook, Pa.				
OLE NO.	SURFACE 2 ELEVATION	RI	• NO	DATE:	· I	From 2/3 To 2	2/3	_ 19	76	
	BORING LOG		SP0	ON SA	MPLE	AND CORE DATA	BLOWS	S ON	CASI	NG
	DESCRIPTION OF MATERIAL			BLOWS		DEDRY USUNDISTURBED TETRAP	0-1		51-52	
DEPTH	Based On Samples Recovered	SAMPLE Number	DEPTH	PERXX.		W=WASH R=ROD C=CORE	1 - 2	_	52-53	
	Plus Observation Of Material	불뿔	FROM-TO	ON	ROCX	CORE RECOV'D - NO. PCS.	2 - 3		53-54 54-55	-
FROM-TO	Returned Between Samples	SE	T NONTO	SAMPLES	CORE RECOV'D	REMARKS *	4 -5	8	55-56	
		-		50-			5 -6	 -	56-57	_
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"םי 15	silt		5'0"-				7 - 8	힏	58 - 59	_
	ļ	2	615"	1-1	ļ		8-9	H	59-60	
			10'0"-				9-10	381	60-61	
1510"	Gray silt	3	11'6"	1-2			10-11	0	61-62	
יים 🔛 פוי	dray silt	1. 1	15'0"-				11-12		62-63	
		4	16'6"	3-3			12-13		63-64	
25'0"	Decomposed gneiss	انا	16'6"-			1	13-14		64-65	
31'0"	Decomposed Greess	_5_	18'0" 21'0"-	1-1 WOH-	-		14-15		65-66 66-67	-
ט בכ		6				Silt and vegetation	II		67-68	
		-	25'0"-			SIII ENG VEGETAGIO	17-18		68-69	
		7	26'6"	8-14			18-19		69-70	
			30'0"-				19-20		70-71	
		8	31'0"	125		Refusal at 31'.	20-21		71-72	
				İ			21-22		72-73	<u> </u>
	1	<u> </u>					22-23		73-74	├
	-]		23-24		74-75	
		-		-	·		24-25		75-76	├—
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				ì			28-29		79-80	!
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	1			<u> </u>			30-31		81-82	
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•				}		· ·	33-34		84-85	├—
		<u> </u>			 		34-35		85-86	
			'				36-37		86-87 87-88	 -
		+		1	 		37-38		88-89	-
				1			38-39		89-90	
					1		39 - 40		90-91	
	1						40-41		91-92	.ļ
		1				1	41-42		92-93	
		<u></u>		ļ	 		42-43		93-94	· ·
					1		43-44		94-95	
	NAME WATER	1	ACING 155		-	ISTANCE HAMMER DROP 20-30 INCH	45-46		95-96	-
GRC	OUND WATER PIPE A		ASING LEFT	REASON		DRIVE HAMMER 3(1) LBS.	46-47		97-98	-
	4:30pm_2/3/76		one	.,		SPOON HAMMER 11, LBS.	47-48		98-07	1-
9	3:00am 2/4/76					CASING SIZE 4 INCH	48-49		99-100	1
						SPOON SIZE 2 INCH	49-50		102-101	
· · · · · ·		<u> </u>					50-51		101-102	1
~ (' : ' C	assification of soil has been m	ade by	the drill	er and h	as not b	een Not responsive de	ue to revised s	cope		

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling Water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller

Not responsive due to revised scope

Helper

Helper

C = 1.33

301.1

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

ORIGINAL . (Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

<u> </u>						·				
AME:	Metcalf & Eddy, Inc.				LOCATI	on: Marcus H	ook, Pa	•		
OLE NO.	3 SURFACE ELEVATION	Ř3	C NO			From 2/4			19	76
	BORING LOG		SPO	ON SA	MPLE	AND CORE DATA		BLO	VS ON	CASING
	DESCRIPTION OF MATERIAL			BLOWS		DEDRY UFUNDISTURBED) T=TRAP	0-1		51-52
DEPTH	Based On Samples Recovered	SAMPLE NUMBER	DEPTH	PERANT.		W=WASH R=ROD	C*CORE	1 - 2		52-53
	Plus Observation Of Material	포	FROM—TO	611	ROCK	CORE RECOV'D - N	O. PCS.	2 - 3		53-54
FROM-TO	Rcturned Between Samples	S IX	FRUM-10		CORE RECOV'D			3 -4	공	54-55
			<u> </u>		MECOA-D			4 - 5		55-56
יים ים	Sand, silt, cinders,	ı	1'6"	23-20		Damp, dense		5 - 6	CAS	56-57 57-58
3,0"	gravel, fill		5'0"-	4-	 	Damp, deriae		7 - 8	Si	58-59
	graver, irr	2	6'6"	2-2		Damp, loose		8 - 9	- <u>2</u> -	59-60
7.00			10'0"-					9-10	В	60-61
3'0"	Cinders, fill	<u>3A</u>	11'0"	1-2		Damp, soft		10-11	-0	61-62
"			11'0"-			l <u>-</u>		11-12	_ E _	62-63
		38	1.1'6"	16	ļ <u>.</u>	Damp, medium		12-13	- 20	63-64
8'0"	D== = = 13.6	4	15'0"- 16'6"			D		13-14	<u> </u>	64-65
"םיוו	Brown silt	4		7 <u>-9</u> 100		Damp, medium		15-16	I up	65-66 66-67
	·	5		No re	L .	Damp, very de	158	16-17	- izi	67-68
				1				17-18	-6-	68-69
ייםיוו	Brown silty sand							18-19		69-70
14'0"	with some gravel		_					19-20		70-71
								20-21		71-72
14'0"	Brown decomposed	1		1				21-22		72-73
20'1"	gneiss	<u> </u>						22-23		73-74
20 1	9.16133							23-24		74-75 75-76
-								25-26		76-77
			Set wel	l poi	ht ta	depth of 15'.		26-27		77-78
								27-28		78-79
								28-29		79-80
								29-30		80-81
-		<u> </u>						30-31		81-82
		ľ				,		31-32		82-83
				 			·	33-34		83-84
								34-35		84-85
								35-36		86-87
								36-37		87-88
	-							_37-38_		68-89
		ļ						38-39		89-90
	·		•			, i		39-40 40-41		90-91
				 				41-42		91-92
								42-43		92-93
				†				43-44		94-95
11 maa - 11 maa 12 maa		<u> </u>						44-45		95-96
GRO	UND WATER PIPE A	ND CA	SING LEFT	IN HOLE	. 01	STANCE HANMER DROP 21		45-46		96-07
. 1714	HOUR DATE SIZE	AMO	TAU	REASON		DRIVE HAMMER		46-47		97-98
7'	3:30pm 2/9/76					SPOON HAMMER Casing Size	4 INCH	47-48		98-99
					-	SPOON SIZE	2 IN CH	49 - 49		99-13-
						SIZE OF CORE BIT.	I N CH	42:50		702-101 701-107 (
	assification of soil has been ma	de by	the drille	er and ha	s not be	een Not	esponsive o	ue to rev	sed se	one
)				Driller	ponorec (- TO V		

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Theor Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at denth encountered.

Driller___Not responsive due to revised scope

ne i per

Helper C-1.34

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

B.P. Dil Refinery Property

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME:	Metcalf & Eddy, Inc.				LOCATI	on: Marc	us Hook, Pa	•	
 HOLE NO.	SURFACE ELEVATION	R	IG NO.	DATE:	ı	From 2/3	To	2/4	19 76
	BORING LOG			ON SA		AND CORE			ON CASIN
				011 02				0-1	
	DESCRIPTION OF MATERIAL	~	DEDT!!	BLOWS	l	ì	STURBED T=TRAP	J	51-52
DEPTH	Based On Samples Recovered Plus Observation Of Material	SAMPLE	DEPTH	PERXIX.	ļ			2 - 3	53-54
FROM-TO	Returned Between Samples	E S	FROM-TO	ON	ROCK CORE	1	'D NO. PCS.	3 -4	54-55
	<u> </u>			SAMPLES	RECOV'D	- REM	ARKS-*	4 -5	55-56
<u>יים ים</u>			-"טיט	I-		_	:	5 -6	56-57
ייםיט ייםיא3	Gray organic silt	1	1'6"	0-1		Soft,	noist	6 - 7	57-58
J4.0	, -	2	5'0"- 6'6"	0- 1-1		Cos+		7 - 8	58-59
		-	10'0"-	0-		Soft,	of lignite	8 - 9	59-60
2410"	Greenish-gray fine	3		ĭ-1	}	and fi	ne sand	10-11	60-61
6"	sandy silt, trace of		15'0"-		f		ne edne	11-12	62-63
	small gravel	4		hamme	1	Soft,	moist	12-13	63-64
			20'0"-					13-14	64-65
38'6"	Greenish-gray	5		hamme		Soft,	moist	14-15	65-66
51'6"	decomposed gneiss		25'0"-	Wt. c				15-16	66-67
	ļ	6		hammo		Soft,	moist	16-17	67-68
		7	30'0"- 31'6"	Wt. o hamma	T	Trace	of fine sand	17-18	68-69
	İ		35'0"-	96-	-	i irace	of Time South	19-20	70-71
		В		8-5	{	Damp		20-21	71-72
			40'0"-	19-				21-22	72-73
		9		24-32		Damp		22-23	73-74
	· [45'0"-	14-	!			23-24	74-75
		10	46'5"	22-27	<u> </u>	Damp		24-25	75-76
•		1,,	50'0"-	22-	ĺ			25-26	76-77
		11	51'6"	37_68	 	Damp		27-28	77-78
	i			1				28-29	78-79 79-80
		$\overline{}$						29-30	80-81
•	}				<u></u>			30-31	81-82
				}				31-32	82-83
			ļ	ļ	<u> </u>			32-33	83-84
					-			33-34	84-85
		 				1		34-35	85-86
				,	į			36-37	87-88
	1				1			37-38	88-89
		<u></u>	,					38 - 39	89-90
	1							39+40	90-91
		 	ļ	 				40-41	91-92
				1				41-42	92-93
		-	 		 			43-44	93-94
				1	1			44-45	95-26
GR	OUND WATER PIPE	ND C	ASING LEFT	IN HOLI	E 01	STANCE HAMMER	DROP24-30 INCH	~!	96-97
	WHIR DATE SIZE		OUNT	REASON		DRIVE HA	MMER 300 LBS.	46 - 47	97-98
0'6"_1	10 am 2/6/76					SPOON HA		11	28-99
						CASING Spoon		1	99-101
						SIZE OF CORE		13:50	100-101
7						JALL OF COME	· · · · · · · · · · · · · · · · · · ·	50-51	[301-102]

**Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground

Driller Not responsive due to revised scope

Helper

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

B. P. Dil Refinanch Recoperty

FOUNDATION TESTING and SOIL SAMPLING RECORD

								
NAME:	Metcalf & Eddy, Inc.				LOCATI	on: Marcus Hook, Pa.		
HÔLE NO	SURFACE		G NO.	DATE:		From 2/5 To 2,	/5 1	9 76
	BORING LOG		SP0	ON SA	MPLE	AND CORE DATA	BLOWS C	N CASI
	DESCRIPTION OF MATERIAL			BLOWS	· ·	DEDRY UEUNDISTURBED TETRAP	0-1	51-52
DEPTH	Based On Samples Recovered	ш <u>«</u>	DEPTH	PERXX.		WEWASH REROD CECORE	1 - 2	52-53
	Plus Observation Of Material	SAMPLE Number		6"	ROCK	CORE RECOV'D - NO. PCS.	2 - 3	53-54
FROM-TO	Returned Between Samples	S S	FROM-TO	ON SAMPLES	CORE	REMARKS *	3 - 4	54-55
					RECOV'D	NEMAKKO.	4 - 5	55-56
יםים י		1. 1	-"0'0	0-		1	5 -6	56-57
13'6"	Gray organic silt	1	1'6"	0-1		Soft, moist	6 - 7	57-58
15.6.		2	5'0" - 6'6"	0-1	Ì	G-64	7 - 8	58-59
		1-	10'0"-	Wt. c	<u>-</u>	Soft, moist	9-10	59-60
13'6"	Greenish-gray silty	3		hamma		Soft, moist	10-11	61-62
יים יים יים	sand and gravel		15'0"-	91-	<u> </u>	301 6, 110136	11-12	62-63
	-	4	16'6"	94-58	}	Dense, moist	12-13	63-64
	 		20'0"-		 	- 3	13-14	64-65
18'0"	Brown decomposed	5	20'4"	150/4	11	Damo	14-15	65-66
20'4"	gneiss			}			15-16	66-67
							16-17	67-68
				ĺ	ļ		17-18	68-69
	•						18-19	69-70
		l l		{	!		19-20	70-71
	 	├		 	 		20-21	71-72
				1	Ì	1	22-23	72-73
						 	23-24	74-75
	i)	İ	24-25	75-76
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		1 1		}	}	\ .	29-30	80-81
	· ·			<u> </u>			30-31	81-82
	1			1	1		31-32	82-83
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						<u> </u>	35-36	86-87
	1						36-37	87-88
		1			T		37-38	88-89
	1						38-39	89-90
	1						39-40	99-91
				ļ			40-41	91-92
)			41-42	92-93
	1			<u> </u>			42-43	93-94
				1		1	43-44	94-95
	AUND WATER		Verbe 1 22-	I service	<u> </u>	STANCE HANNER DROP 24-30 INCH	-11	96-97
GRI			SING LEFT	REASON	·	DRIVE HAMMER DROP24-30 INCH DRIVE HAMMER 300 LBS.		97-98
	10 gm 2/G/76	71110	-	712.100/1		SPOON HAMMER		98-99
. u .u	49					CASING SIZE NCH	49-49	99.1.00
						SPOON SIZE 2 INCH	42-50	100-101
						SIZE OF CORE BITINCH	50-51	301-108

**Clf: 'Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.



. 301..

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

B. P.	Oil	Refinery Property
• • • • • • • • • • • • • • • • • • • •	• 7 2	Refinery Property

FOUNDATION TESTING and SOIL SAMPLING RECORD

(AME:	Metcalf & Eddy, Inc.				LOCATI	on: Marcus I	look. Pa.			
	SURFACE									
ICLE NO.	15 ELEVATION	R				From 2/4		5	19	76
	BORING LOG		SP0	ON SA	MPLE	AND CORE DAT	A	BL0	WS ON	CASING
	DESCRIPTION OF MATERIAL			BLOWS		DEDRY UEUNDISTUR	BED TETRAP	0-1	j	51-52
DEPTH	Based On Samples Recovered	SAMPLE	DEPTH	PERXX.		W=WASH R*RJD	C=CORE	1 - 2	ON	52-53
FROM-TO	Plus Observation Of Material Returned Between Samples		FROM-TO	6"	ROCK	CORE RECOVID -		2 - 3	8	53-54 54-55
FRUM-10	Recorded Beckeen Samples	ω ×			CORE RECOV'O	REMARKS	*	4 -5	5	55-56
	Brown silt, sand		בייטים_					5 -6	Smi	56-57
0'0"	and gravel, trace of	_1	2'0"	8-9				6 - 7	77	57-58
6'6"	cinders, fill	1	2'0"-					7 - 8	Ç3	58-59
		2	4'0"	8-7				8 - 9	DUI.F	59-60
6'6"	Gray river silt,	3	6'0"	6-6 -7-7		'		9-10	REC	61-62
Ö "	oily		6'0"-					11-12	-	62-63
		4	7'6"	2-2				12-13		63-64
	Gray river silt	_	7'6"-					13-14		64-65
9'0"	with trace of	5	9'0"	20-19				14-15		65-66
40'0"	vegetation	6	9'0"- 10'6"	2 - 2-1				15-16		66-67
			10'6"-	2-1				17-18		68-69
40'0"	Grav sandy silt	U7	12'6"	Push	21"	3" Shelby T	ube _	18-19		69-70
41'6"	diay sainty silt		12'6"-	1-				19-20		70-71
		8	14'0"	1-1_				20-21		71-72
41'6"	Gray fine to coarse	9	14'0"-	1-1				21-22		72-73
44 10"	sand and fine to	广	15'6"-		 			23-24		74-75
	medium gravel	10	17'0"	1-1				24-25		75-76
•		11	17'0"-	1 -				25-26		76-77
44 10"	Gray decomposed gneiss		18'6"	1-1_		·-		26-27	ļI	77-78
49 ' 0 "			18'6"- 20'0"	1-2			-	27-28		78-79
	 	12						29-30		79-50 80-81
		J13	20'0"-		24"	3" Shelby T	ube ·	30-31		81-82
	1		22'0"-	1				31-32		82-83
		14		1-1				32-33		83-84
	1	١, -	23'6"-	1				33-34	<u> </u>	84-85
	1	15	25'0"	1-2	 			34-35 35-36	 	85-86
		16	25'0"- 25'6"	1-1				36-37		86-87 87-83
		1	26'6"-	1-				37:38		88-89
		17	28'0"	1-2				38 - 39		89-90
	1		28'0"-	1-			,	39-40	 	90-91
		18	29'6"	1-1-	 			40-41		91-92
		19	29'6"- 31'0"	1-1		· ·		42-43		92-93
		<u> </u>	31 '0"-	1-				43-44	 -	94-95
F15111 55111 55111		20	32'6"	1-2_				4-115		95-24
GRO			ASING LEFT		E D:	STANCE HAMMER DROP	30_INCH	45-46	<u>. </u>	96-97
0.14	HOUR DATE SIZE		TNUC	REASON		DRIVE HAMMER Spoon Hammer		46 - 47		97-98
6'0"			ione —		\dashv			47-48	ļ. — —	99-07 99-1
-5!6"	8_am2/9/76					SPOOM SIZE		42:50		
					لب	SIZE OF CORE BIT	IM CH	50-51	!	101-107
	assification of soil has been ma	ide h	the drill	er and h	as not b	Pen R	lot responsive due to	revised sec	, —, :22 92 •••	=:

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller

Helper

Helper

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301.

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

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	100° 11	•		•	•
	(Red)	٠			
	19000	1	•	•	•

FOUNDATION TESTING and SOIL SAMPLING RECORD

												
NAME:	Metcalf & Eddy, Inc.		LOCATION: Marcus Hook, Pa.									
HOLE NO.	SURFACE ELEVATION	R	G NO	DATE:	1	From _	2/4	То	2	/5	19	76
	BORING LOG		SP0	ON SA	MPLE	AND	CORE D	ATA		BLOWS	ON	CASIN
	DESCRIPTION OF MATERIAL			BLOWS	· ·	D=DRY	U=UNDIS	TURBED T	= TRAP	0-1		51-52
DEPTH	Based On Samples Recovered	w &	DEPTH	PER FT.		W=WAS	94 R*R	OD C	C=CORE	1 - 2		52-53
	Plus Observation Of Material	SAMPLE NUMBER	5001. 70		ROCK	COR	E RECOV'D	- NO.	PCS.	2 - 3		53-54
FROM-TO	Returned Between Samples	SA	FROM-TO	ON SAMPLES	CORE	1	REMAR			3 - 4	_#	54-55
		<u> </u>	27171		RECOVID		NCPA I			4 -5	#	55-56
	1		32'6"-	2-		1				5 -6		56-57
	1	21	34'0"	-2-2		ļ :				6 - 7	#	57-58
		22	34'0"- 35'6"	2-2		(7 - 8		58-59
	ļ	122	35'5"-	1-						8 - 9	-#	59-60
		23	37'0"	2-2						10-11		60-61
		122-	37'0"-	2-						11-12		62-63
		24	38'6"	2-2						12-13		63-64
			38'6"-	1-						13-14		64-65
		25	40'0"	2-2						14-15	—∦	65-66
			40'0"-	1-						15-16	-	66-67
		26	41'6"	1-2		L				16-17		67-68
			41'6"-	5-						17-18		68-69
		27	43'0"	18-35						18-19		69-70
			43'0"-	29-						19-20		70-71
	<u></u>	28	44'6"	35-14						20-21	_	71-72
·			44'6"-			l				21-22		72-73
		29	46'0"	22-24						22-23		73-74
			46'0"-	18-				•		23-24		74-75
		30	4716"	20-38	<u> </u>					24-25	#	75-76
٠.	'	-,	47'6"-							25-26		76-77
		31	49'0"	34-56	 -					26-27		77-78
_			Į	İ						27-28	∦	78-79
	 	 		 						29-30	-#	79-80 80-81
					[•			30-31	∦	81-82
		-								31-32		82-83
			35 min.	Perm	eabil:	ity T	esting	Time.		32-33		83-84
					-					33-34	—- <u>I</u> I	84-85
		1			}					34-35		85-86
										35-36		86-87
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						1				41 - 42		92-93
		-			ļ	<u> </u>				42-43		93-94
			}		ļ	l				43-44		94-95
minum et et	1	1	<u> </u>	ــــــــــــــــــــــــــــــــــــــ	<u>!</u>					·		95-26
			ASING LEFT	IN HOLE	<u>-</u>		BRIVE HAM		L BS.	45-46	<u> </u>	96+97
: P1H 1	HOUR DATE SIZE	AM	TAUC	KENSUN			SPOON HAM		L 8\$.	47-48		97-98
							CASING S		[N CH	49 - 49		99.13
							SPOOR S		INCH	49-50	# !	102-101
						8128	OF CORE	B1 7	IN CH	50-51		101-107
	lassification of soil has been ma		15.2 4.11						sive due to	de la la la la la la la la la la la la la	-z ()	

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Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground

Driller
Helper
Helper
C-1.38

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

Θ.	Р.	Oil	Ref	iner	у Рі	operty
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(Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

Metcalf & Eddy, Inc. Marcus Hook, Pa. LOCATION: SURFACE 10LE NO. 16 2/5 **ELEVATION** RIG NO. DATE: 19 76 CORE SPOON CATA BORING LOG SAMPLE AND BLOWS ON CASING DEDRY UFUNDISTURBED 0-1 51-52 DESCRIPTION OF MATERIAL BLOWS SAMPLE NUMBER 1 - 2 52-53 W=WASH C=CORE DEPTH Based On Samples Recovered PERXIX. DEPTH 2 - 3 53-54 Plus Observation Of Material CORE RECOV'L - NO. PCS. RO CK FROM-TO 3 -4 54-55 FROM-TO Returned Between Samples CORE REMARKS * SAMPLES RECOV'D 4 -5 55-56 -ייםים 5 -6 3-56 • 57 ייחיח Brown silt, sand, 6 - 7 57-58 1'6" 3-4 8'0" gravel, clay, fill 5'0"-1-7 - 8 58-59 2 ឆ 616" 1-1 8 - 9 59-60 9-10 10'0"-1 -60-61 8'0" Gray organic river 11'6" 2-2 10-11 61-62 silt 11-12 62-63 -"ם י15 1-16'6" 12-13 63-64 1-1 13-14 64-65 20'0"-1-Gray organic river 20'0" 21'6" 0-1 14-15 65-66 silt with vegetation 2516" 25**'**0"-15-16 2-66-67 and sand 26'6" 7-11 16-17 67-68 30 ' 0". 17-18 10-68-69 2516" Gray-brown 7 31'6" 21 - 3318-19 69-70 41'6" decomposed oneiss 35 | D". 36 | 6" 20-27-37 19-20 70-71 B 20-21 71-72 40'0"-31-21-22 72-73 9 41'6" 70-96 22-23 73-74 23-24 74-75 24-25 75-76 25-26 76-77 26-27 77-78 27-28 78-79 28 - 29 79-80 29-30 80-81 30-31 81-82 31-32 82-83 32-33 83-84 33-34 84-85 34-35 85-86 35-36 86-87 36-37 87-68 cs-88 37:38. 38 - 30 69-90 39 - 40 90-91 91-92 40-41 41-42 92-93 42-43 93-94 43-44 94-95 44-45 95-95 95-97 45-46 GROUND WATER PIPE AND CASING LEFT IN HOLE DISTANCE HAMMER DROP INCH 300 DRIVE HANMER LB\$. 46-47 : 119 I HOUR DATE SIZE AMOUNT REASON 97-39 SPOON HANNER 140 LBS: 3'6" | 4_pm 3'6" | 10_am 47-48 94-17 2/09/70 none CASING SIZE __ NX 2/10/26 _1 N CH 1 50 49 - 49 SPOON SIZE 1 N CH 49 - 50 J02-1:1: 1 H CH SIZE OF CORE BLT. 50-51 [[0]-1.

checked by a soils engineer. Classification of rock has been made by the driller and has not been the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Priller Not responsive due to revised scope

Halpar
Helper C-1.39

301 '

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

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						-	

FOUNDATION TESTING and SOIL SAMPLING RECORD

AME:					LOCATI	on:	Marcus H	look, Pa	•		
OLE NO.	17 SURFACE ELEVATION	R	I G NO	DATE:	1	From	/9	To	10	19	76
	BORING LOG		SPO	ON SA	MPLE	AND COF	RE DATA		BLOV	YS ON	CASING
DEPTH FROM—TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE	DEPTH FROM-TO	BLOWS PERXX. 6" ON SAMPLES	ROCK CORE RECOV'D	W=WASH	R-ROD ECOV'D REMARKS *	C=CORE	0-1 1 - 2 2 - 3 3 - 4 4 - 5	NC B-	51-52 52-53 53-54 54-55 55-56
0'0" 8'0"	Brown silt, sand, gravel, clay, fill	1 2	0'0"- 1'6" 5'0"- 6'6"	4-4					5 -6 6 - 7 7 - 8	ows RE	56-57 57-58 58-59
8'0"	Gray organic river silt	<u>U3</u>	10'0"- 11'10" 15'0"- 16'10"	Pùsh	22"	_sampl	elby Tub		8 - 9 9-10 10-11 11-12 12-13	QUIRED	59-60 60-61 61-62 62-63 63-64
16'10" 17'6"	Gray sandy silt	_		ple -			ge in wa	sh	13-14 14-15 15-16 16-17		64-65 65-66 66-67 67-68
17'6" 20'0"	Decomposed gneiss	·	water.			ļ	ge in wa s, no pa		17-18 18-19 19-20		68-69 69-70 70-71 71-72
									21-22 22-23 23-24 24-25		72-73 73-74 74-75 75-76
									25-26 26-27 27-28 28-29		76-77 77-78 78-79 79-80
									29-30 30-31 31-32 32-33		80-81 81-82 82-83 83-84
									33-34 34-35 35-36		84-85 85-86 86-87
									36-37 -37-38 -38-39 -39-40		87-88 88-89 89-90 90-91
	•								40-41 41-42 42-43 43-44 44-45		91-92 92-93 93-94 94-95
3!	UND WATER PIPE A HOUR DATE SIZE 4 pm 2/10/76 assification of soil has been m	AMO	ASING LEFT	REASON		SPOO CAS SP SIZE OF	MER DROP VE HAMMER ON HAMMER SING SIZE POON SIZE CORE BIT		45-46 46-47 47-48 48-49 49-50 56-51		95-96 96-97 97-98 98-99 98-101 102-101 101-102

checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions etc., at depth encountered.

Helper **C-1.40**

301

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

FOUNDATION TESTING and SOIL SAMPLING RECORD

ORIGINAL (Red)

AME: M	atcalf & Eddy, Inc.		_		LOCATI	on: Mar	cus Hoo	k, Pa.			
OLE NO.	18 SURFACE ELEVATION	R1	I G NO	DATE:	F	rom2	/12	To2/	13	19	76
	BORING LOG	Ī	SP0	ON SA	MPLE	AND CORE	E DATA		BLO	WS ON	CASING
	DESCRIPTION OF MATERIAL			BLOWS		D=DRY -U=U	JNDI ST JRBEC	T=TRAP	0-1		51-52
DEPTH	Based On Samples Recovered	SAMPLE	DEPTH	PERXX.		W=WASH	R=RC)	C.CORE	1 - 2		52-53
	Plus Observation Of Material	불물	FROM-TO	6" 0N	ROCK	CORE REC	COV'D - N	O. PCS.	2 - 3		53-54 54-55
FROM—TO	Returned Between Samples	S ₹	FRUM-10		CORE RECOV'D	F	REMARKS *		4 -5		
			0'0"-						5 -6		55-56 56-57
יים ים		1	1'6"	hamme	1 1	Somo	il :lud		6 - 7		57-58
20'0"	Gray organic silt		2'0"-	Wt. a		Julie 0	#### # # ##	<u> </u>	7 - 8		58-59
		2	3'6"	hamme		Soft.	moist		8 - 9		59-60
5010"			5'0"-	Wt. o					9-10		60-61
20'0"	Greenish-gray	3_	6'6"	hstmme	r	Soft,	moist_		10-11		61-62
3	decomposed gneiss	١.	10'0"-						11-12		62-63
		4	11'6"	hamme		Soft,	<u>moist</u>		12-13	I	63-64
		5	15'0"- 16'6"			C-E+ .			13-14		64-65
		F-	20'0"-	hamme 4-	r	Soft,	moist		15-16		65-66 66-67
		6		6-10	·	Damn			16-17		67-68
			25'0"-						17-18		68-69
•	•	7		24-30		Damp			18-19		69-70
	·		30'0"- 31'6"	21- 30-42					19-20		70-71
		8				Damp			20-21	<u> </u>	71-72
		9	35'0"- 36'6"	41- 68-11		Demp			21-22		72-73
		-	0 0	00-11		UZIIID			23-24		74-75
						i			24-25		75-76
•		+-		 					25-26		76-77
		<u></u>							26-27		77-78
			3'6" 0	l f wate	r to t	ottom	f pond.		27-28		78-79
									28-29	 	79-80
	<u>.</u>	1	ŀ	ŀ					29 -3 0 30 - 31		80-81
	·	-			 	 			31-32		81-92
	l ·		PERMEA	ILITY	TESTS	.			32-33		83-84
		1							33-34		84-85
			DEPTH		TIME				34-35		85-86
	·		21	7	D mins				35-36		86-87
		 -	-	<u> </u>		·			36-37		87-89
		1	51	2	b mins				_37-38_ 38-39	 -	89-90
				 					39-40	 	99-91
			10'	2	D mins	•			40-41		91-92
		\top	TOT::	T-0					41-42	1	92-93
	1		TUTAL	TESTI	אנו דוו	1 H	r. 10 m	ins.	12-43		93-94
									43-44		94-95
11 Page 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1	<u> </u>	1	1	!			. 70	44-45		95:25
	,		ASING LEFT	REASON	<u></u> ⁰¹	STANCE HAMM	EN DROP <u>2</u> Enammer		45-46		96-97
** 114 1	HOUR DATE SIZE	VIV	-	HEADON			HAMMER		47-48	 	3H-u3
•						CASI	ING SIZE	NX_INCH	49 - 49	÷	90.1
					——		OON SIZE	2_INCH	49-50		/102-101L
					<u> </u>	SIZE OF (CORE BIT	1 H CH	50-51		101-107
·6.15. C1	assification of soil has been m	ade b	y the drill	er and h	as not b	een	N	ot responsive	due to rev	ised scor	-

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions at at death encountered.

Driller Not responsive due to revised scope

Helper C-141

30,1 .

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

ORIGINAL (Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

AME:	Metcalf & Eddy, In	С.			LOCATI	on: Marcus	s Hook, P	a.		
OLE NO.	SURFACE ELEVATION	RI	G NO	_DATE:	F	From 2/9	то	2/10	_ 19	76_
	BORING LOG		SP0	ON SA	MPLE	AND CORE	DATA	BLOW	SON	CASING
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE NUMBER	DEPTH FROM—TO	BLOWS PERFAT. ON SAMPLES	ROCK CORE RECOVID	CORE RECOV		ORE 1 - 2 2 - 3 3 - 4 4 - 5		51-52 52-53 53-54 54-55 55-56
0'0" 4'0"	Gray-brown silt, some small gravel, fill	1.	0'0"- 1'6" - 2'0"- 3'6"	6- 2-2 2- 2- 2-2		Demp Moist		5 -6 6 - 7 7 - 8 8 - 9		56-57 57-58 58-59 59-60
4'0"	Gray organic silt	3	5'0"- 6'6" 10'0"- 11'6"	1- 1-1 5- 5-7		Soft, mo	oist	9-10 10-11 11-12 12-13		60-61 61-62 62-63
9'6" 18'3"	Greenish-gray to brown decomposed gneiss	5	15'0"- 15'6" 18'0"- 18'3"	16- 16-18		Damp Damp		13-14 14-15 15-16 16-17	-	64-65 65-66 66-67 67-68
								17-18 18-19 19-20 20-21 21-22		68-69 69-70 70-71 71-72
			PERME No. 1	ABILI - 2'		TS:		22-23 23-24 24-25		72-73 73-74 74-75 75-76
· .			No. 2	1		mins.		25-26 26-27 27-28 28-29		76-77 77-78 78-79 79-80
			TOTAL	TESTI	NG TIM	E – 1 hou	ır	29-30 30-31 31-32 32-33		80-81 81-82 82-83 83-84
			Waiting	betw	en te	sts 1 & 2	<u>- 30 min</u>	33-34 34-35 35-36 36-37		84-85 85-86 85-87 87-88
								37-38 38-33 30-40 40-41		98-89 80-90 90-91 91-92
	•						·	41-42 42-43 43-44 44-45		93-94 94-95 95-96
GR(::'14	OUND WATER PIPE A NOOR DATE SIZE 4 pm 2/11/76		ASIN' LEFT	IN HOLI REASON	E 01	SPOOM HA Casing	AMMER 300 SIZE NX SIZE 2	LBS. 46-47 LBS. 47-48		95-97 97-98 98-93 98-13 102-101 101-107

'C'assification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller	Not responsive due to revised scope
Helper	
Hel per	C-1.4Z

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

1	ORIGINAL	
	(Red)	•
		٠

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME:	"Metcalf & Eddy, Inc	•			LOCATI	on: Marcu	ıs Hook, Pa	•	
HOLE NO.	20 SURFACE ELEVATION	R I	G NO	DATE:		From 1/30	то2	/3	19 76
	BORING LOG		SPO	ON SA	MPLE	AND CORE	ATAC	BLOWS	ON CASING
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE	DEPTH FROM-TO	BLOWS PERXX. 6" on samples	ROCK CORE RECOV'D	CORE RECOV	TURBED TETRAP OD CECORE D - NO. PCS. RKS	0-1 1 - 2 2 - 3 3 - 4 2 4 - 5	51-52 52-53 53-54 54-55 55-56
"0'0 "0'7	Silt, concrete, sand, gravel, fill	1 2	0'0". 2'0" 2'0". 3'6"	5-6		Taking co: samples O	tinuous to 43'6".	5 -6 F 6 - 7 F 7 - 8 U	56-57 57-58 58-59 59-60
7'0" 24'0"	Gray river silt	3 U4	3'6"- 5'0" 5'0"- 7'0"	2_ 2_2 Push	10½"	3" Shelt	y Tube	8 - 9 R 9-10 C 10-11 C 11-12 R 12-13 D	60-61 61-62 62-63
24'0" 25'6"	Gray river silt with seams of fine to medium sand	5	7'0"- 8'6" 8'6"- 10'0"	1-2 2- 2-3		·		13-14 14-15 15-16 16-17	64-65 65-66 66-67 67-68
25'6" 37'6"	Gray river silt with trace of vegetation	7 8	10'0"- 11'6" 11'6"- 13'0"	1- 1-1 1- 1-2				17-18 18-19 19-20 20-21	68-69 69-70 70-71 71-72
37'6" 40'0"	Gray sandy silt	9	13'0"- 14'6" 14'6"- 16'0"	1- 1-1 1- 1-2				21-22 22-23 23-24 24-25	72-73 73-74 74-75 75-76
. 40'0" 43'0"	Silt, sand, gravel and decomposed granite	11	16'6"- 18'0"- 18'0"- 19'6"	1- 1-1 1-				25-26 26-27 27-28 28-29	76-77 77-78 78-79 79-80
() () () () () () () () () () () () () (Gray decomposed gneis s	13	19'6"- 21'0" 21'0"- 22'6"	1- 1-1 1- 0-1				29-30 30-31 31-32 32-33	80-81 81-52 82-83 83-84
44'0" 49'0"	Gray soft to medium hard deco mposed gneiss	15 16	22'6"- 24'0"- 24'0"- 25'6"	1- 0-1 2- 2-2				33-34 34-35 35-36 36-37	84-85 85-86 85-87 87-89
		17 18	25'6"- 27'0"- 27'6"-	1- 2-1 1- 2-1				37:38 38:39 39:40 40:41	89-99 89-90 90-91 91-92
	•	19 20	28'6"- 30'0" 30'0"- 31'6"	1- 2-2 1- 0-1				41-42 42-43 43-44 44-45	92-93 93-94 94-95 95-96
5:B"+	HOUR DATE SIZE 4 pm 2/4/76 assification of soil has been ma	AM0	SING LEFT	REASON		SPOON S SIZE OF CORE	LBS. MER 140 LBS. 126 - 14X	45-46 46-47 47-48 48-49 49-50 50-51	95-27 97-28 28-29 96-122 302-121 101-122

'Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

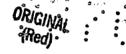
Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller Not responsive due to revised scope

Helper C-1.43

301

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.



FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME:	Metcalf & Eddy, Inc.				LOCATI	on: Marci	ıs Hook. Pa.		
	SURFACE								56
HOLE NO.	20 ELEVATION	R	G NO.	_DATE:	. 1	rom 1/30	To _2/	<u>3</u> 1	9 76
	BORING LOG		SPO	ON SA	MPLE	AND CORE	DATA	BLOWS C	N CASING
	DESCRIPTION OF MATERIAL			DI OWS		D=DRY U=UND	STURBED TETRAP	0-1	51-52
DEPTH	Based On Samples Recovered	w &	DEPTH	BLOWS PER FT.		W=WASH R	ROD C-CORE	1 - 2	52-53
	Plus Observation Of Material	SAMPLE			ROCK	CORE RECOV	'D NO. PCS.	2 - 3	53-54
FROM-TO	Returned Between Samples	SA N	FROM-TO	ON SAMPLES	CORE	1	ARKS *	3 -4	54-55
					RECOV'D			4 -5	55-56
		27	31'6"- 33'0"	1-] 			5 -6	56-57
•		21	33'0"-	1-2 2-					57-58
		22	34'6"	1-2				7 - 8	58-59
		55	34'6"-	1-				9-10	59-60
		23	36'0"	4-2				10-11	61-62
			36'0"-	1-				11-12	62-63
	1	24	37'6"	1-1	1			12-13	63-64
		$\overline{}$	37'6"-	4-				13-14	64-65
		25	39'0"	3-4				14-15	65-66
			39'0"-	2-				15-16	66-67
		26_	40'6"	4-8				16-17	67-68
		22	40'6"-	3.55				17-18	68-69
		27_		11-28	<u> </u>			18-19	69-70
		20	42'0"-	21-		٠		19-20	70-71
		28_	43'6"	17-47				21-22	72-73
								22-23	73-74
			4410"-					23-24	74-75
	1		4910"		24"	Core		24-25	75-76
								25-26	76-77
	'					·		26-27	77-78
								27-28	78-79
•		ļ		ļ ·				28-29	79-80
	i				}			29-30	80-81
	İ	<u> </u>	<u> </u>					30-31	81-82
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			1					36-37	87-88
				1				37-38	88-89
		L		<u></u>	<u>L</u>			38-39	89-90
								39-40	90-91
		↓		ļ				40-41	91-92
	•	1 .			1	1		41-42	92-93
		-	ļ	ļ				42-43	93-94
		1		1				43-44	94-95
				<u> </u>	<u> </u>	<u> </u>		=	95-96
			ASING LEFT	IN HOLE	<u> </u>	STANCE HAMMER DRIVE HA		45-46	96-97
: P7H 1	HOUR DATE SIZE	AMI	TAUC	KENSUN		SP00# H		47-48	97-98
						CASING		48-49	99-100
						SPOOM	SIZEHHCH	49-50	102-101
						SIZE OF COR	. BITINCH	50-51	101-102
~ £ 1 : • C	assification of soil has been ma	ade by	the drill	er and ha	as not be	een	Not responsive due	to revised scope	n distribution states s

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

	روغوري در <u>درود در طا</u> وره <u>دروم محمد من محمد ما استخدام م</u>
Driller_	Not responsive due to revised scope
Helper _	
Helper (2-1.44

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

FOUNDATION TESTING and SOIL SAMPLING RECORD

AME: M	etcalf & Eddy, Inc.				LOCATI	ON:	Marcu	ıs Hoc	k, Pa	a			
OLE NO.	SURFACE ELEVATION			DATE:		From	2/6		2/		19	76	
*	BORING LOG		SPO	ON SA	MPLE	AND C	ORE DA	TA		· BLO	NS ON	CASI	NG
	DESCRIPTION OF MATERIAL	·		BLOWS		D=DRY	U±UNDIS1.	JRBED .	r= TRAP	0-1		51-52	
DEPTH	Based On Samples Recovered	SAMPLE	DEPTH	PERKKT.		W=WASH	R•R(2 (C*CORE	2 - 3		52-53	
FROM-TO	Plus Observation Of Material Returned Between Samples	A B	FROM-TO	6" on	ROCK	CORE	RECOV'D		PCS.	3 -4		54-55	
r RUM— TO	No to the bottom of the bottom	S Z		SAMPLES	RECOV'O		REMARK	(S [‡]		4 ~5		55-56	
	Gray-brown silt,		-ייטים							5 6		56-57	
"םים	cinders and gravel,	1	1'6"	5-7		Dry	<u> </u>			6 - 7		57-58	
10'6"	miscellaneous fill	2	5'0" - 6'6"	36-		0		-		7 - 8		58-59	
		1-	10'0"-	2-		Dan	<u> </u>			8 - 9 9-10		59-60 60-61	
10'6"	Gray organic silt	3	11'6"	2-2		Dan	מה			10-11		61-62	
15'0"	dray organic site		15'0"-	5-						11-12		62-63	
		4	16'4"	94-10	<u> </u>	Mod	lst			12-13		63-64	
<i>∞i</i>	Reddish-brown fine	_	20'0"-	35-						13-14		64-65	
15'0"	sandy silt and	_5_	21'6"	28-52 54-	 	Dan Dan	<u> </u>			15-16		65-66 66-67	
18'0"	gravel	6	24'0"	76-82		Dan	מח			16-17		67-68	_
		1	26'0"-							17-18		68-69	
18'0"	Brown decomposed	7	27'6"	118-1	62	_ Dan	np			18-19		69-70	
25'0"	gneiss				-					19-20		70-71	_
		 	 	 		 				21-22		71-72 72-73	-
25'0"	Gray decomposed			1						22-23		73-74	
27'6"	gneiss									23-24		74-75	
										24-25		75-76	
•						1				25-26 26-27		76-77	
		-	 	+	 	 -				27-28		77-78 78-79	-
	1									28 - 29		79-80	_
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		-			1					37-38		89-89	<u> </u>
			 	 	 	-				39 - 40		89-90	
				1		1			-	40-41		91-92	<u>;</u> —
										41-42		92-93	
				<u> </u>	1					42-43		93-94	ļ
•										43-44		94-95	ļ
	1	1	10140 155	<u> </u>		I STANCE H	Auu (5 . 5	001. Z	() 1400	45-46		95-96 96-97	1-
GRO	HOUR DATE SIZE		ASING LEF	REASON			AMMER DRI			46-47	 	97-98	
12' 1	5 pm 2/9/70					\$ 7	ИМУН ИОО	ER 14	LBS:	47-48		98-09	1
						(12 DHIZA:		X_INCH	48 - 49		99.1	1
		-				\$17F F	SPOON SI OF CORE B		2_INCH	49-50		002-101	-
										50-51	<u> </u>	101-105	ل
*6.17: C	assification of soil has been m	nade b	y the dril	ler and h	as not b	been .	Driller	Not res	ponsive d	ue to revis	ed scope		

checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Oriller Not responsive due to revised scope

Helper C-1, 45

301

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

ORIGINAL (Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME:	Metcalf & Eddy, Inc.				LOCATI	on: Marcus Hook, P	a.	
IOLE NO.	SURFACE 22 ELEVATION	R	I G NO			From 1/2! To	1/30 19	76
	BORING LOG		SPC	ON SA	MPLE	AND CORE DATA	BLOWS OF	CASING
	DESCRIPTION OF MATERIAL	. 7		BLOWS		DEDRY UFUNDI: TURBED TETR	AP 0-1	51-52
DEPTH	Based On Samples Recovered	SAMPLE	DEPTH	PER XX		WEWASH Re. OD CeCO		52-53
FROM-TO	Plus Observation Of Material Returned Between Samples	AM B	FROM-TO	6"	ROCK	CORE RECOV' > - NO. PC	3 - 4	53-54
FRUM-10	Recommed Beckeen Camping	S X		SAMPLES	CORE RECOV®D	REMARKS *	3 -4 Z 4 -5	55-56
	Cilt concrete	\vdash	-"מים	3-			5 -6	56+57
יים ים .	Silt, concrete, sand, gravel, glass,	1	1'6"	3-5			6-7	57-58
8'0"	fill		5'0"-			·	7 - 8	56 - 59
	1111	2	7'0"	Taken	from	refuse <u>-tute</u>	8-9 7	59-60
8'0"		U3	11'0"- 13'0"	Push	22"	3" Shalby Tuba	9-10	60-61
יים י	Gray river silt	22	15'0"-	Pusn_		3" Shelby Tube	11-12	61-62
	'	U4	17'0"	Push	23"	3" Shelby Tube	12-13	63-64
70.00			20'0"-	1-			13-14	64-65
30'0"	Gray river silt	_5_	21'6"	1-1	ļ		14-15	65-66
38'0"	with some vegetation	_	25'0"-	1-			15-16	66-67
		6	26'6" 30'0"-	1-2	-		16-17	67-68
38'0."	Sand, gravel and	7	31'6"	1-1			17-18	68-69
42'0"	decomposed granite	<u> </u>	35'0"-	1-	 		19-20	70-71
		8	36'6"	1-2			20-21	71-72
42'0"			40'0"-	30-			21-22	72-73
47'0"	Soft decomposed	12	41'6"	37-60			22-23	73-74
	gneiss	10	41'6"-	80 Ref.		Used 300 lb. hamme	23-24 F 24-25	74-75
		10	42 0	1,61.		0380 300 10: 178111118	25-26	75-76
. 47'O"	Gray hard weathered						26-27	77-78
52'0"	gneiss		42'0"-				27-28	78-79
			47'0"	ļ	2"		28-29	79-80
			47'0"-	i			29-30	80-81
	1 .		52'0"	 	54"		30-31	81-92
	}				,		32-33	82-83
							33-34	84-85
		<u></u>					34-35	85-86
							35-36	86-97
		₩		1			36-37	87-68
			1				37-38 38-39	89-90
		-		1			39-40	90-91
			<u> </u>	<u> </u>			40-41	91-92
							41-42	92-93
	,		ļ				42-43	93-94
	1]				,	43-44	94-95
	I DIES WATER	1	ACINC LEST	1		TANCE WANNED BOOK		95-95
GRO	HOUR . DATE SIZE		ASING LEFT	REASON	"I		BS. 45-46	97-98
	pm 1/30/76	מת				SPOON HAMMER 140 L	88. 47-48	99-93
<u>5! †i</u>	pm 2/03/76					CASING SIZE - NX		99-131
 .					-	SPOON SIZE 2 I	<u>49-50</u>	102-101
1,040							50-51	101-1021
. C.	assification of soil has been ma	ade by	the drill	er and h	as not b	een Driller	due to revised scope	

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.



301,

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

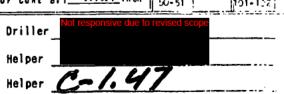
ORIGINAL (Red)

FOUNDATION TESTING and SOIL SAMPLING RECORD

AME: 1	Metcalf & Eddy, Inc.				LOCATI	ON:	Marcu	3 H00	k, Pa	•		
OLE NO.	SURFACE B-23 ELEVATION	RIG!	NO	DATE:	1	From _	5/13	т	<u> 5/</u>	13	_ 19	_76
	BORING LOG		SP0	ON SA	MPLE	AND	CORE	ATA		BLOWS	ON	CASING
DEPTH FROM—TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	<u>트</u> ভ	EPTH)M-TO	BLOWS PERMET F	ROCK CORE RECOY®D	COR	E RECOV'	00	T=TRAP C=CORE . PCS.	0-1 1 - 2 2 - 3 3 - 4		51-52 52-53 53-54 54-55
0.0'	Fill, silty sand with gravels	1 1	.0'- .5'	4- 7-11 1-						4 - 5 5 - 6 6 - 7 7 - 8		55-56 56-57 57-58 58-59
8.0'	Silty sand with cobbles	2 6 3 11 15	.5' .0'- .5'	1-2 18- 17-12 11-				·		8 = 9 9-10 10-11 11-12		59-60 60-61 61-62 62-63
21.0'	Gray decomposed gneiss	4 16 5 21 6 25	.0'- .5'	17-30 8- 19-50 75		Тор	of ro	ek2	1.0'	12-13 13-14 14-15 15-16		63-64 64-65 65-66 66-67 67-68
25.5° 30.5°	Gray gneiss, weathered	25	.5'-		42"					17-18 18-19 19-20 20-21	_	68-69 69-70 70-71 71-72
				Botto	m of	hole	30.	5'		21-22 22-23 23-24 24-25		72-73 73-74 74-75 75-76
•										25-26 26-27 27-28 28-29		76-77 77-78 78-79 79-80
				201 0	£ NV	0.263	ng us	od in	bolo	29-30 30-31 31-32		80-81 81-82 82-83
				20 0	I NA	Casi	ing us	ed III	note	32-33 33-34 34-35 35-36		83-84 84-85 85-86 86-87
										36-37 37-38 38-39 39-40		87-88 88-89 89-90 90-91
										40-41 41-42 42-43 43-44		91-92 92-93 93-94 94-95
GRC	DUND WATER PIPE A HOUR DATE 0 5/13/76	AND CASIN AMOUNT None		IN HOLI			HAMMER DRIVE HAS SPOON HAS CASING SPOON OF CORE	MMER 3 MMER 1 SIZE	30 INCH ()0 LBS. 40 LBS. (IX INCH 2 INCH X14 INCH	44-45 45-46 46-47 47-48 48-49 49-50 50-51		95-95 96-97 97-98 98-99 96-11 100-101
-('=: 'C'	assification of soil has been m	ade by th	e drille	er and h	as not b	een	Orille	Not resp	onsive due t	o revised scope		

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Under Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.



301,

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

FOUNDATION TESTING and SOIL SAMPLING RECORD

AME: M	etcalf & Eddy, Inc.		<u> </u>		LOCATI	on: Marcus	Hook, Pa.			
OLE NO.	24 SURFACE ELEVATION		6 NO			From 2/11		12	19	76
	BORING LOG		SPO	ON SA	MPLE	AND CORE DA	TA	BLOW	S ON	CASING
	ESCRIPTION OF MATERIAL			BLOWS		D=DRY U=UNDISTU	RBED TETRAP	0-1		51-52
DEPTH	Based On Samples Recovered	SAMPLE NUMBER	DEPTH	PER XX	Į.	W≐WASH R∙ROD	C-CORE	1 - 2		52-53
	Plus Observation Of Material	M M		6"	ROCK	CORE RECOV'D	- NO. PCS.	3 - 4		53-54
FROM-TO	Returned Between Samples	\$ ₹	FROM-TO		CORE RECOV'D	REMARK	s *			54-55
		-	_ חוחיו	Wt. c		=		4 -5 5 -6		55-56
0'0"	· _	1	1'6"	hamme	1	Some oil s	ludos	6 - 7		56-57 57-58
19'6"	Gray organic silt		21()"-				20090	7-8		58-59
		2	316"	hamma	1	Some oil s	ludos	8 - 9		59-60
			5'0"-					9-10		60-61
19'6"	Greenish-gray	_3_	616"	hemma	r	Some oil s	ludge	10-11		61-62
0"	decomposed gneiss		10'0"-					11-12		62-63
	.3	4	11'6"	hammo		Soft, mois	t	12-13		63-64
		٠_	15'0"-					13-14		64-65
		5_	16'6"	hamme	Pr	Soft, mois	t	14-15		65-66
		6	20'0"- 21'6"	8-12		Damp	·	15-16	$-\parallel$	66-67
			25'0"-		 	. valiip		17-18		68-69
1		7	26'6"			Damp	ŀ	18-19		69-70
	•	<u> </u>						19-20	#	70-71
	·	8	30'0"- 31'6"	60-59	[Damp		20-21		71-72
		_	3316"-	44-				21-22		72-73
		9	35'0"	114-10	18	Damp	·	22-23		73-74
		l					1	23-24		74-75
		ļ		ļ ·				24-25		75-76
٠.			1.1 -5		to be	ttom of pond	1	25-26		76 - 77
		_	4.01	marer	100 00	l com or porto	•	27-28		78-79
	·		1		1			28-29		79-80
		 						29-30		80-81
	1					·		30-31		81-82
<u> </u>	1		DEDME	D.T. TT.	TECT	<u></u>		31-32		82-83
		↓	PERME	BILLI	1151	þ:		32-33		83-84
			255			<u> </u>	1	33-34		84-85
			DEF	in	TIM	<u> </u>		34-35		85-86
		1	2'		30	mins.	 }	35-36		86-87
		+				 		37-38		87-88 88-89
			5'		30	mins.	l)	38-39		89-90
				1	_			39-40		90-91
			י 10		30	mins.		40-41		91-92
	• ==		****			L		41-42		92-93
		<u></u>	TOTAL	1511	AP ITW	E - 1 Hr. 3	U mins.	42-43		93-94
				1	1		-	44-45		94-95
F175-117-11-1-117	I	1	1	<u></u>	1	L	. 7/ 70 114	45-46		96-97
GRO			ASING LEFT	REASON	<u>. </u>	STANCE HAMMER BROK	R 300 LBS.	46-47		97-98
		-3141/	-		_		R 140 Las.	47-48	 -j	98-99
						CASING SIZ	E NX INCH	49-49		99+1,30
							E 2 _ INCH	49-50		102-101
						SIZE OF CORE BI	TINCH	50-51		101-102
	The second secon	1- 1-	the drill							

'Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Chair Remarks mention kind of Bit, loss of sample, loss of Drilling inter, soft meany or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.



SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

ORIGINA	į
(Red)	

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME:	Metcalf & Eddy, Inc.	<u>.</u>			Locati	ON:	Marcus	Hook, Pa	•	
HOLE NO.	SURFACE 25 ELEVATION	R1	G NO	_DATE:	. 1	From	2/13	То	2/13	19 76
•	BORING LOG	<u> </u>	SPO	ON SA	MPLE	AND	CORE D			S ON CASING
DEPTH FROM-TO	DESCRIPTION OF MATERIAL Based On Samples Recovered Plus Observation Of Material Returned Between Samples	SAMPLE Number	DEPTH FROM-TO	BLOWS PERXX 6" ON SAMPLES	•	1	SH R*RC	- NO. PCS	QP 0-1	51-52 52-53 53-54 54-55 55-56
0'0" 4'0"	Gray organic silt	1 2	1'6" 2'0"- 3'6"	Wt. c hamme Wt. c	f r f	5	Soft, mo	-	5 -6 6 - 7 7 - 8 8 - 9	56-57 57-58 58-59 59-60
4'0" 7'0"	Reddish-brown fine to medium sandy silt, some gravel		5'0"- 6'6" 10'0"- 11'6"	15- 20-25 24-	-	. ,	Moist Damp		9-10 10-11 11-12	60-61 61-62 62-63
7'0" 11'6"	Brown decomposed gnaiss								13-14 14-15 15-16 16-17	64-65 65-66 66-67 67-68
		Not	: 3'8"	of ազ	ter t	o bot	ttom of	pond.	17-18 18-19 19-20 20-21	68-69 69-70 70-71 71-72
				MEABIL PTH	ITY T	ESTS:			21-22 22-23 23-24 24-25	72-73 73-74 74-75
			. 2	•	3	O mir			25-26 26-27 27-28	75-76 76-77 77-78 78-79
		TOTA	L TESTI			5 mir			28-29 29-30 30-31	79-80 80-81 81-82
									31-32 32-33 33-34 34-35 35-36	82-83 83-84 84-85 85-86 86-87
									36-37 37-38 38-39 39-40	87-88 88-89 89-90
	• • • • • • • • • • • • • • • • • • •								40-41 41-42 42-43 43-44 44-45	91-92 92-93 93-94 94-95
	UND WATER PIPE A	AMO	SING LEFT	REASON		8128	HAMMER OR DRIVE HAMM SPOON HAMM CASING SI SPOON SI OF CORE B	ER 140 LB ZE NX IN ZE 2 IN	CH 45-46 S. 46-47 S. 47-48 CH 48-49 CH 49-50	95-96 96-97 97-98 98-99 99-100 102-101 101-102

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

Theor Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller
Not responsive due to revised scope
Helper
Helper
C-/, 47

SPRAGUE & HENWOOD, Inc. SCRANTON, PA.

ORIGINAL. (Red).

FOUNDATION TESTING and SOIL SAMPLING RECORD

NAME:	Metcalf & Eddy, Inc.				LOCATI	on: Marcus Ho	ok. Pa.			
HOLE NO.	26 SURFACE ELEVATION	R	G NO	DATE:			-	/29	19	76
 :	BORING LOG		SP0	ON SA	MPLE	AND CORE DATA	1	BLOW	S ON	CASIN'
	DESCRIPTION OF MATERIAL			BLOWS		D=DRY U=UNDISTURE	BED TETRAP	0-1		51-52
DEPTH	Based On Samples Recovered	SAMPLE	DEPTH ·	PERXIX.		W=WASH R*ROD	C.CORE	1 - 2		52-53
	Plus Observation Of Material Returned Between Samples	AMP UMB	FROM-TO	6"	ROCK	CORE RECOV'D		2 - 3	Ã.	53-54 54-55
FROM-TO	Recorded Between Samples	S X		SAMPLES	CORE RECOY®D	REMARKS	\$	4 -5	2	55-56
	5		0'0"-	12-				5 -6	E	56-57
0'0"	Silt, gravel, con-	1	1'6"	15-11				6 - 7	נט	57-58
"0"	crete, sand, asphalt, fill		5'0"-	7-				7 - 8	굞	58-59
	aspirate, 1111	2	6'6" 10'0"-	7-8 2-				9-10	뭅	59-60
3'0"	Brown and gray	3	11'6"	2-3				10-11	7	61-62
"0'8ھـ	silt		15'0"-	1-				11-12	0	62-63
	<u> </u>	4	16'6"	2-2				12-13		63-64
8'0"		5	20'0"-	2-				13-14		64-65
20'0"	Gray Tiver silt	1-	21'6"	3-6 18-				15-16		65-66
		6	25'0"- 26'6"	21-30				16-17		67-68
00101	5		30'0"-	12-				17-18		68-69
20'0" 22'0"	Gray silty fine	7	31'6"	20-31		<u> </u>		18-19		69-70
22.0	sand	8	35'0" - 36'6"	13 - 22 - 32				19-20		70-71
		10		22-32				21-22		72-73
22'0"	Brown fine-medium		·					22-23		73-74
27'0"	sand, gravel and							23-24		74-75
	silt	<u> </u>						24-25		75-76
27'0"	Gray, white and			ļ	ĺ			25-26 26-27		76-77 77-78
36'6"	brown decomposed	_	,					27-28		78-79
	gneiss							28 - 29		79-80
					}			29-30		80-81
		<u> </u>	· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·		30-31		81-82
		1	 		}			32-33		82-83 83-84
								33-34		84-85
		<u></u>	· .					34-35		85-86
	•	1	1	1	1	}		35-36		86-87
	-	 		 	 			36-37		88-89
								38-39		89-90
								39-40		90-91
		 	ļ	 				40-41		91-92
		1	1		1			41-42		92-93
		-						43-44		94-95
		1	<u> </u>	<u> </u>			·	44-45		95-96
GR	OUND WATER PIPE	ND C	ASING LEFT		E D	STANCE HAMMER DROP		45-46		96-97
: 1114 1			TNUC	REASON		DRIVE HAMMER Spoon Hammer		46-47		97-98
6'6" 6'6"			<u>⊓</u>		-	CASING SIZE	4"-NXINCH	47-48		98-99
چىنى ئاللىلىنىكى. قانسان سى د						SPOON SIZE	2 INCH	49-50	I	102-121
,						SIZE OF CORE BLT.	KO MI	50-51		101-102
*6127	lassification of soil has been m	ade h	the drille	er and h	as not h	een N	ot responsive due to	revised scope		

Classification of soil has been made by the driller and has not been checked by a soils engineer. Classification of rock has been made by the driller and has not been checked by a geologist.

There Remarks mention kind of Bit, loss of sample, loss of Drilling water, soft seamy or broken Rock, Caving, Cavities, unusual Ground water conditions, etc., at depth encountered.

Driller
Helper
Helper
C-1,50

Commonwealth of Pennsylvania Department of Environmental Resources Solid Waste Management

	Permit	Number	
ORIGINA	L		
/Nost			

APPLICATION FOR PERMIT FOR SOLID WASTE DISPOSAL and/or PROCESSING FACILITIES

ee INSTRUCTIONS on Reverse Side			· · · · · · · · · · · · · · · · · · ·
1. Applicant (Name and Address) BP OIL, Incorporated P. O. Box 428 Marcus Hook, Delaware County, Pennsylvania 19061 3. Property Owner(s) (Name and Address) BP OIL, Incorporated P. O. Box 428 Marcus Hook, Pa. 19061	L. Bubri Superint BP OIL I P. O. Bo Marcus H Pennsylv 4. Type of O 5. Name of F	endent Engineering ncorporated x 428 ook,Delaware County ania 19061 peration SLUDGE PROCES acility Marcus Hook F	Refinery
·	City-Boroug	h-Township <u>Marcus Hook</u>	· · — — — — — — — — — — — — — — — — — —
Center of Facility: LAT. 3 9 4 9 1	Quad if published 9 0 0 " 4 3 0 " Map: 7 1n.	Number of acres proposed for	N/A years ded as a part of the Solid
N.W. Corner - NORTH 12.55 in. WEST 4. Corner - NORTH 12.5 in. WEST 4. S.W. Corner - NORTH 12.4 in. WEST 4.	•6 in.	Is County Commission's app	
Ground Water Module phase I 🗍	phase II K	9. Documents prepared by: Bruce A. McCrodd Engineering Supe Environmental BP OIL, Incorpor P. O. Box 428 Marcus Hook, Pen Telephone Number	ervisor
Sworn and subscribed to before me the	SS: his 19 75 RY PUBLIC	applicant) (am an officer or of authority to make this applicat	depose and say that I (am the inficial of the applicant) (have the sion) and that the documents and if this application are true and wledge and belief.

7/17/75

CO' INWEALTH OF PENNSYLVANIA DEPARTA FOF ENVIRONMENTAL RESOURCES COMMUNITY ENVIRONMENTAL SERVICES

SOLID WASTE DISPOSAL AND/OR PROCESSING SITE APPLICATION MODULE

ORIGINAL (Red)

For Department of Health Use Only

	PHASE I	1		
PREPARED BY (Name & Address)				
				1
	ART I - LAND DISPOSAL FACILITY			
A. SITE IDENTIFICATION	•			
1. NAME OF SITE BP OIL INC	orporated Marcus Hook Re	finery		
2. ADDRESS OF SITE P. O. BOX	428 ** ook, Pa., 19061			
		• • •		
3. SITE ACQUISITION (Check Appropriate 8	llock)			
PRESENTLY OWNED WILL PURCHASE	WILL LEASE FOR	YEARS		
4. OWNER OF RECORD (Name & Address)	P. O. Box 428		_ _	
	Marcus Hook, Pennsylvan	ia 1906]	L -	
B. FACILITY INFORMATION				
1. IS THIS AN EXISTING FACILITY?			X Yes	□ No
2. IS THIS A PROPOSED FACILITY?			Yes	X No
Æ9	RT II - GOVERNMENTAL APPROVAL			
A. SITE APPROVAL FROM COUNTY AND MU	NICIPALITY			
IF THE SITE WILL BE IN A MINE, HAS THE COUNTY IN WHICH THE SITE IS LOTTED.		N/A	Yes	☐ No
2. HAS THE PROPOSED SITE BEEN APPRO WILL BE LOCATED?	OVED BY THE MUNICIPALITY IN WHICH IT	N/A	Yes	☐ No
B. REQUIREMENTS	•			
ARE THERE ANY CERTIFICATES, PERM REQUIRED BY ANY OF THE FOLLOWING		:NSES		
A. MUNICIPALITY? (If Yes, Describe)			Yes	X No
B. PLANNING COMMISSION (II Y	scribe)		Yes	X No
		······································		

H712.122 REV. 1-71 DATE PREPARED

C' IONWEALTH OF PENNSYLVANIA
DEPART NT OF ENVIRONMENTAL RESOURCES COMMUNITY ENVIRONMENTAL SERVICES

7/17/75

E. AGRICULTURAL

F. MIXED

G. NONE

SOLID WASTE DISPOSAL AND/OR PROCESSING

ORIGINA (Red)

			ICATION MOD PHASE I	ULL	For Department o	t Health Use On	ly
B. REQUIREMEN	VTS - CONTINUED		*				
C. COUNT	Y? (If Yes, Describe)					Yes	K No
							•.
D. STATE	DEPARTMENT OF I	MINES AND	MINERALS? (I	Yes, Describe)	· · · · · · · · · · · · · · · · · · ·	Yes	X No
			N.	· · · · · · · · · · · · · · · · · · ·		•	
E. OTHER	7 (If Yes, Describe)		•			Yes	X No
			•			• . •	
						-	
C. ZONING					•		
1. CLASSIFIC	CATION OF SITE		INDUSTRI	AL			
2. ENFORCE	MENT AGENCY	Boro c	f Trainer	, Pennsyl	vania		!
3. WILL ZON	ING OF SITE PERM	T SANITA	RY LANDFILL?			Yes	No
4. RESTRICT	IONS (If Any)		None	2			
	T PROPERTIES WIT		RTER-MILE (Che	ck Appropriate Blo	cks Which Indicate Th	e Use Of Adjacent	
		•	North	East	South	West	
A, RESIDE	NTIAL	•	X				
B. COMME	RCIAL				Ü	XX	
C. LIGHT	INDUSTRIAL						
D. HEAVY	INDUSTRIAL			¥			

C JONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
COMMUNITY ENVIRONMENTAL SERVICES

7/17/75

SOLID WASTE DISPOSAL AND/OR PROCESSING

SITE APPLICATION MODULE

PHASE II

ORIGINAL (Red)

For Department of Health Use Only

PHASE II		
PART I - SOLTO WAS	TE CHARACTERISTICS	
SOURCE, TYPE, AND VOLUME OF WASTES (CH TION OF THE TYPE OF PRESENT WASTE AND 1 LIFE OF THE LANDFILL IS LESS THAN 10 YEA IN THE FINAL YEAR OF LANDFILL OPERATION OUS WASTES WHICH ARE PROPOSED TO BE A FILL.) A. SOURCE TYPE (Description)	0-YEAR PROJECTED VOLU ARS, WHAT IS THE PROJECT DN? SUBMIT CHEMICAL AN CCEPTED OR ARE BEING A	ME — IF THE PROPOSED FED VOLUME OF WASTE ALYSES OF HAZARD-
t. RESIDENTIAL		
2. COMMERCIAL	· .	•
4. AGRICULTURAL		
	£ \$200 000	
5. OTHER (EXPLAIN)		
ADDITIONAL COMMENTS ON SOURCE, TYPE, AND VOL	-	
Processed and disposed off	<u>site in accorda</u>	nce with the
attached Operation Plan.		
B. DAILY WASTE QUANTITIES (INDICATE AMOUNT OF WAST	TE THE LANDFILL WILL AC	CEPT EACH DAY, STATED IN VOLUME
	VOLU	UME WEIGHT
1. ESTIMATED PER CAPITA DAILY WASTE QUANTITIES	N/A_	N/A
2. MAXIMUM DAILY VOLUME OR WEIGHT	N/A	
3. MINIMUM DAILY VOLUME OR WEIGHT	N/A_	N/A
4. AVERAGE DAILY VOLUME OR WEIGHT	N/A	N/A
5. RATIO (MAX. OVER MIN.)		N/A
PART II LANDFILL D	ESIGN AND OPERATION	

A. DETAILED PLANS AND MAPS OF LANDFILL

SUBMIT ONE COPY OF EACH SET OF PLANS AND MAPS WITH EACH MODULE. THE FRONT COVER OR FLYLEAF OF EACH SET OF DRAWINGS AND SPECIFICATIONS MUST BEAR THE SIGNATURE AND SEAL OF THE REGISTERED PROFESSIONAL ENGINEER. EACH DRAWING MUST BEAR AN IMPRINT OR REASONABLE FACSIMILE OF SUCH SEAL.

- 1. PROPERTY LINE MAP
 - A. ONE MAP SHOULD INDICATE PROPERTY LINES OF SITE, USE OF ADJACENT PROPERTIES, AND SHOULD SHOW ALL RIGHT-OF-WAYS (FUEL AND POWER LINES, ROADS, ETC.)

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C(ONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES COMMUNITY ENVIRONMENTAL SERVICES

SOLID WASTE DISPOSAL AND/OR PROCESSING SITE APPLICATION MODULE

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r	- 1	. OI	_	

		• N / A		
(1) IF RIGHT-OF-WAYS EXIS	T, NAME OF OWNER/COMPANY	N/.B		
(2) DOES OWNER OR OPERA	TOR OWN MINERAL RIGHTS?		Ye	s No
(3) IF NOT, NAME AND ADD	RESS OF OWNER OF MINERAL RIG	HTS N/A	· · · · · · · · · · · · · · · · · · ·	
	<i>bt</i>			
2. DETAILED TOPOGRAPHIC MAP(S (MORE THAN ONE MAP MAY BE	S) OF SITE SHOULD INCLUDE THE USED TO SHOW THE REQUIRED IN	•	D BELOW)	
A. SCALE (1:200' OR LARGER, M	SEANING RATIO LARGER THAN .00	05)	N,	<u>'</u>
B. 5' CONTOUR INTERVAL	•	weeks on the second	N/	<u>'A</u>
C. LOCATION OF ACCESS ROAD	S AND ROADS ON LANDFILL		_ N/	<u>'A</u>
D. LOCATION OF FENCING	•		_N/	<u>'A</u>
E. LOCATION OF WEIGHING FA	CILITIES	,	N/	<u>'A</u>
,	PROPOSED UTILITIES E LOCATED FARTHER THAN A QU BE SHOWN ON PROPERTY LINE MA		N/	'A
G. LOCATION OF HIGH-TENSION	POWER LINE RIGHT-OF-WAYS		<u> </u>	'A ·
H. LOCATION OF DISCHARGE P	DINT OF GROUND WATER		N/	Ά
I. LOCATION OF AND IDENTITY WELLS DRILLED AT HIGHEST	Y OF MONITORING WELLS, SPRING FELEVATION	iS, AND	<u> </u>	'
J. DIRECTION OF GROUND WAT	TER FLOW (IF MORE THAN ONE DI HER DIRECTIONS ALSO.)	RECTION OF GROUN	ND _N	'A
MAP IF IT IS WITHIN THE SITE	FOLLOWING INFORMATION ON TI E OR WITHIN A QUARTER-MILE OF M BELOW AS IT IS PLACED ON THE	F THE OUTER PERIM MAP.)	ETER OF	·
WELLS	SOIL STOCKPILE "	N/A	POWER LINE R	IGHT-OF-WA
SPRINGS	FIRE HYDRANTS		FUEL LINE RIC	GHT-OF-WAY
SWAMPS	OTHER BODIES OF W	/ATER	LIFTS	
STREAMS	UNDERGROUND & St	URFACE MINES	WATER TOWE	RS .
PUBLIC WATER SUPPER	ES MINING SPOIL PILES		DIVERSION DI	TCHES
FIRE PONDS	GAS & OIL WELLS			٠.

H712.122 REV. 1-71 DATE PREPARED

7/17/75

CO.MMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES

COMMUNITY ENVIRONMENTAL SERVICES SOLID WASTE DISPOSAL AND/OR PROCESSING ORIGINAL (Red)

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SITE APPLICATION MODULE PHASE II

3. LIFT DESIGN (CHECK EACH	ITEM AS IT IS INCLUDED ON THE DETAILED PLANS.)	•
A. TOTAL THICKNESS OF EA	ACH LIFT	N/A
B. WORKING GRADE OF EAC	• CH LIFT	N/A
C. SLOPE AND WIDTH OF WO	DRKING FACE "	-N/A
D. APPROXIMATE TIME INTE	ERVAL BETWEEN LIFTS	. <u>N/A</u>
E. SEQUENCE OF LIFTS AND	COVER MATERIAL USAGE IN FILL AREA	N/A
F. FINAL SLOPE SEQUENCE	•	N/A
G. COVER SUPPLY SOURCES	·	_N/A
H. DRAINAGE DEVICES		N/A
. PLANS FOR FINISHED SITE (CHECK EACH ITEM INCLUDED)	
	SLOPE AND CONTOURS	N/A
	OTHER (EXPLAIN ON LIST) QUIRED NEAR THE HIGHEST ELEVATION OF THE PROPO	
. ONE BORING OR WELL IS RE DEPTH OF 10 FEET INTO THE	OTHER (EXPLAIN ON LIST) QUIRED NEAR THE HIGHEST ELEVATION OF THE PROPO E GROUND WATER OR 20 FEET INTO THE BEDROCK, WHICH UND WATER IS ENCOUNTERED, SUBMIT CHEMICAL ANAI	CHEVER IS DEEPER. (MAXI
. ONE BORING OR WELL IS RE DEPTH OF 10 FEET INTO THE DEPTH — 100 FEET). IF GROU	OTHER (EXPLAIN ON LIST) QUIRED NEAR THE HIGHEST ELEVATION OF THE PROPO E GROUND WATER OR 20 FEET INTO THE BEDROCK, WHICH UND WATER IS ENCOUNTERED, SUBMIT CHEMICAL ANAI PLETED.)	CHEVER IS DEEPER. (MAXI
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ONE BORING OR WELL IS REDEPTH OF 10 FEET INTO THE DEPTH — 100 FEET). IF GROW (CHECK EACH ITEM AS COMPA. PROVIDE A COMPLETE LOB. INDICATE METHOD OF DE	OTHER (EXPLAIN ON LIST) QUIRED NEAR THE HIGHEST ELEVATION OF THE PROPO E GROUND WATER OR 20 FEET INTO THE BEDROCK, WHICH UND WATER IS ENCOUNTERED, SUBMIT CHEMICAL ANALY PLETED.) OG (DESCRIPTION) OF WELL	CHEVER IS DEEPER. (MAXILYSES OF GROUND WATER
ONE BORING OR WELL IS REDEPTH OF 10 FEET INTO THE DEPTH — 100 FEET). IF GROW (CHECK EACH ITEM AS COMPA. PROVIDE A COMPLETE LOB. INDICATE METHOD OF DE	OTHER (EXPLAIN ON LIST) QUIRED NEAR THE HIGHEST ELEVATION OF THE PROPO E GROUND WATER OR 20 FEET INTO THE BEDROCK, WHICE UND WATER IS ENCOUNTERED, SUBMIT CHEMICAL ANALY PLETED.) OG (DESCRIPTION) OF WELL RILLING D TREATMENT PROPOSAL	CHEVER IS DEEPER. (MAXILYSES OF GROUND WATER
ONE BORING OR WELL IS REDEPTH OF 10 FEET INTO THE DEPTH — 100 FEET). IF GROWN (CHECK EACH ITEM AS COMPANDED AS COMPANDED AS COMPLETE LOBORISM DE LEACHATE COLLECTION AND ALLOCATION OF TREATMENT	OTHER (EXPLAIN ON LIST) QUIRED NEAR THE HIGHEST ELEVATION OF THE PROPO E GROUND WATER OR 20 FEET INTO THE BEDROCK, WHICE UND WATER IS ENCOUNTERED, SUBMIT CHEMICAL ANALY PLETED.) OG (DESCRIPTION) OF WELL RILLING D TREATMENT PROPOSAL	N/A
ONE BORING OR WELL IS REDEPTH OF 10 FEET INTO THE DEPTH — 100 FEET). IF GROW (CHECK EACH ITEM AS COMPANDED AS COMPANDED AS COMPLETE LOBORISM AS CONTRACTOR OF TREATMENT B. CROSS-SECTIONS OF TREATMENT.	OTHER (EXPLAIN ON LIST) QUIRED NEAR THE HIGHEST ELEVATION OF THE PROPO E GROUND WATER OR 20 FEET INTO THE BEDROCK, WHICE UND WATER IS ENCOUNTERED, SUBMIT CHEMICAL ANAI PLETED.) OF (DESCRIPTION) OF WELL RILLING	N/A
ONE BORING OR WELL IS REDEPTH OF 10 FEET INTO THE DEPTH — 100 FEET). IF GROWN (CHECK EACH ITEM AS COMPANDED AS PROVIDE A COMPLETE LOB. INDICATE METHOD OF DEPTH OF THE ACCURATION OF TREATMENT OF TREATMENT OF THE ACCURATION OF TREATMENT OF THE ACCURATION OF TREATMENT OF THE ACCURATION OF TREATMENT OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF DISCHARGE OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCURATION OF THE ACCUR	OTHER (EXPLAIN ON LIST) QUIRED NEAR THE HIGHEST ELEVATION OF THE PROPO E GROUND WATER OR 20 FEET INTO THE BEDROCK, WHICE UND WATER IS ENCOUNTERED, SUBMIT CHEMICAL ANAI PLETED.) OF (DESCRIPTION) OF WELL RILLING D TREATMENT PROPOSAL IT FACILITIES ATMENT LAGOONS AND PROPOSED COLLECTION FACILITY	N/A N/A N/A N/A N/A
ONE BORING OR WELL IS REDEPTH OF 10 FEET INTO THE DEPTH — 100 FEET). IF GROWN (CHECK EACH ITEM AS COMPANDED AS COMPLETE LOB. INDICATE METHOD OF DELECTION AND ALLOCATION OF TREATMENTS. CROSS-SECTIONS OF TREATMENTS. LOCATION OF DISCHARGE LOCATION OF PROPOSED GROWN	OTHER (EXPLAIN ON LIST) QUIRED NEAR THE HIGHEST ELEVATION OF THE PROPO E GROUND WATER OR 20 FEET INTO THE BEDROCK, WHICH UND WATER IS ENCOUNTERED, SUBMIT CHEMICAL ANALY PLETED.) OG (DESCRIPTION) OF WELL SILLING D TREATMENT PROPOSAL IT FACILITIES ATMENT LAGOONS AND PROPOSED COLLECTION FACILITY E POINTS OF TREATED LEACHATE. OUND WATER MONITORING POINTS MUST BE SHOWN ON	N/A N/A N/A N/A N/A
ONE BORING OR WELL IS REDEPTH OF 10 FEET INTO THE DEPTH — 100 FEET). IF GROWN (CHECK EACH ITEM AS COMPANDED AS COMPLETE LOB. INDICATE METHOD OF DEPTH OF THE ACHATE COLLECTION AND ALLOCATION OF TREATMENT B. CROSS-SECTIONS OF TREATMENT C. LOCATION OF DISCHARGE LOCATION OF PROPOSED GROWN	OTHER (EXPLAIN ON LIST) QUIRED NEAR THE HIGHEST ELEVATION OF THE PROPO E GROUND WATER OR 20 FEET INTO THE BEDROCK, WHICH UND WATER IS ENCOUNTERED, SUBMIT CHEMICAL ANALY PLETED.) OG (DESCRIPTION) OF WELL SILLING D TREATMENT PROPOSAL IT FACILITIES ATMENT LAGOONS AND PROPOSED COLLECTION FACILITY E POINTS OF TREATED LEACHATE. OUND WATER MONITORING POINTS MUST BE SHOWN ON	N/A N/A N/A N/A N/A TIES N/A

DATE PREPARED 7/17/75

CUMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES COMMUNITY ENVIRONMENTAL SERVICES

SOLID WASTE DISPOSAL AND/OR PROCESSING SITE APPLICATION MODULE

PHASE II

ORIGINAL (Red)

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1. PROPOSED LANDFILL N	METHOD	·	10. EROSION CONTR	OL	•	<u> </u>
2. SCHEDULE OF FILLING		X	11. TRAFFIC CONTR	OL		
3. SITE PREPARATION		<u> </u>	12. FINAL COVER			X
4. DESIGNATION OF UNLO	ADING AREA	K	13. FINAL SLOPES			_X
5. SIZE OF WORKING FAC	E	·	14. PROPOSED REVE	GETATION PRO	CEDURE	
6. CELL CONSTRUCTION		•	15. COMPLETED SITE	MAINTENANC	E PROVISIONS	<u> </u>
7. COMPACTION & COVER	ING PRACTICE		16. OTHER (SPECIFY)		
8. PROVISIONS FOR BLOW	ING LITTER CO	NTROL				
9. MANAGEMENT OF SURF						
						
	PART III -	LANDFILL O	PERATIONAL SUP	PORT		
	14	RIEF DESCRIPT	ON OF EQUIPMENT I	JSED IN LANDF	ILL OPERATIO	N.
· ,	14		ON OF EQUIPMENT I	JSED IN LANDF	ILL OPERATIO	N.
	14		ON OF EQUIPMENT I	JSED IN LANDF	ILL OPERATIO	ν.
EQUIPMENT 1. LIST TYPE, MODEL NUM	14		ON OF EQUIPMENT I	JSED IN LANDF	ILL OPERATIO	N.
	14		ON OF EQUIPMENT I	JSED IN LANDF	ILL OPERATIO	N.
	14		ON OF EQUIPMENT I	JSED IN LANDF	ILL OPERATIO	N.
	14		ON OF EQUIPMENT I	JSED IN LANDF	ILL OPERATIO	N.
1. LIST TYPE, MODEL NUM	OR TUNNELS	N/A N/A	EATHER ACCESS RO	ADS NEGOTIAB	LE BY LOADED	COLL
ACCESS ROADS, BRIDGES, VEHICLES SHALL BE PROV THE MINIMUM CARTWAY W	OR TUNNELS,—	N/A ROADS (ALL-WATRANCE OF T	EATHER ACCESS RO HE SITE OR FACILIT FFIC SHALL BE TWE	ADS NEGOTIAB Y WHERE A PUB NTY-TWO (22) F	LE BY LOADED	O COLL:
ACCESS ROADS, BRIDGES, VEHICLES SHALL BE PROV THE MINIMUM CARTWAY W	OR TUNNELS,—	N/A ROADS (ALL-WATRANCE OF T	EATHER ACCESS RO HE SITE OR FACILIT FFIC SHALL BE TWE	ADS NEGOTIAB Y WHERE A PUB NTY-TWO (22) F	LE BY LOADED	O COLL:
ACCESS ROADS, BRIDGES, VEHICLES SHALL BE PROV THE MINIMUM CARTWAY W TRAFFIC (SEPARATE ROAD	OR TUNNELS,— IDED TO THE EN	N/A ROADS (ALL-W NTRANCE OF T TWO-WAY TRA CARTWAY WID	EATHER ACCESS RO HE SITE OR FACILIT FFIC SHALL BE TWE TH OF TWELVE (12) I	ADS NEGOTIAB Y WHERE A PUB NTY-TWO (22) F	LE BY LOADED LIC ROAD DOE EET, OR FOR O	O COLL:
ACCESS ROADS, BRIDGES, VEHICLES SHALL BE PROV THE MINIMUM CARTWAY W TRAFFIC (SEPARATE ROAD	OR TUNNELS,— IDED TO THE EN	N/A ROADS (ALL-W NTRANCE OF T TWO-WAY TRA CARTWAY WID	EATHER ACCESS RO HE SITE OR FACILIT FFIC SHALL BE TWE TH OF TWELVE (12) I	ADS NEGOTIAB Y WHERE A PUB NTY-TWO (22) F	LE BY LOADED LIC ROAD DOE EET, OR FOR O	O COLLIES NOT
ACCESS ROADS, BRIDGES, VEHICLES SHALL BE PROV THE MINIMUM CARTWAY W TRAFFIC (SEPARATE ROAD 1. PROVIDE THE FOLLOWIT ROUTE LOAI	OR TUNNELS,— IDED TO THE EN	N/A ROADS (ALL-W NTRANCE OF T TWO-WAY TRA CARTWAY WID ON FOR PUBLIC	EATHER ACCESS RO HE SITE OR FACILIT FFIC SHALL BE TWE TH OF TWELVE (12) I	ADS NEGOTIAB Y WHERE A PUB NTY-TWO (22) F	LE BY LOADED LIC ROAD DOE EET, OR FOR O	O COLLI S NOT DNE-WA
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DATE PREPARED

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PHASE II

		•		
WIDT H .	LENGTH	TYPE (INSERT NUMBER) •	•	ROAD TYPES
			. (1) CON(
		br.	. N/Δ (3) GRA	VEL
			. (4) 5	ER·(Specify)
			· · · · · · · · · · · · · · · · · · ·	· · ·
	CATION, HEIGHT &	WEIGHT RESTRICTIONS -	– INCLUDE ONLY BRIDGES	IN THE AREA LEADING
THE LANDFILL.)	N/A	• .	•	
LOCATION	•••	HEIGHT	WEIGHT	
		RESTRICTIONS	RESTRICTIONS	
		-		
				
	14			
TUNNELS (LOCATIO	•	RICTIONS) N/A		
TUNNELS (LOCATIO	•	RICTIONS) N/A	LOCATION	HEIGHT RESTRICTIONS
	•	RICTIONS) N/A	LOCATION	
	•	RICTIONS) N/A	LOCATION	
	•	RICTIONS) N/A		
	•	RICTIONS) N/A		
TUNI	NEL	RICTIONS) N/A		
RE PROTECTION FIRE DEPARTMENT	NEL			
RE PROTECTION FIRE DEPARTMENT A. NAME	BP OIL, In	corporated		RESTRICTIONS
RE PROTECTION FIRE DEPARTMENT A. NAME	BP OIL, In	corporated		RESTRICTIONS
RE PROTECTION FIRE DEPARTMENT A. NAME	BP OIL. In	corporated 428 Marcus Hoo		RESTRICTIONS
RE PROTECTION FIRE DEPARTMENT A. NAME	BP OIL. In	corporated 428 Marcus Hoo		RESTRICTIONS

7/17/75

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DEPARTMENT OF ENVIRONMENTAL RESOURCES
COMMUNITY ENVIRONMENTAL SERVICES

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PHASE II

ORIGINAL (Red)

For Department of Health Use Only

C. FIRE PROTECTION - CONTINUED	
3. SOIL STOCKPILE	
A. LOCATION N/A	·····
B. VOLUME OF SOILN/A	
4. WATER UNDER PRESSURE A. LOCATION Adjacent to Sludge Lagoon	· · · · · · · · · · · · · · · · · · ·
B. VOLUME OF WATER 3000 GPM	
c. WATER PRESSURE 180 PSi	
D. CONTROL PROGRAM (BRIEFLY DESCRIBE PROGRAM; BE SPECIFIC IF CHEMICALS OR PESTICID	ES ARE TO BE USED.)
1. RODENT CONTROL	N/A
2. FLY CONTROL	N/A
3. BIRD CONTROL	N/A
4. DUST CONTROL	N/A
5. ODOR CONTROL	N/A
6. OTHER (EXPLAIN)	N/A
E. PUBLIC UTILITIES	· _~
	E FACILITY WILL BE LABLE ON THE SITE
1. WATER NO	-1 1075
2. COMMUNICATIONS YES 300 Feet June 10 Telephone	11y 1975

7/17/75

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES COMMUNITY ENVIRONMENTAL SERVICES

SOLID WASTE DISPOSAL AND/OR PROCESSING

SITE APPLICATION MODULE

PHASE II

O'ORIGINAL (RREd)

For Department of Health Use Only

F. EMPLOYEE FACILITIES			•	
•	YES OR NO ON SITE	YES OR NO OFF SITE	DISTANCE TO	DATE AVAILABLE
1. SHELTER	YES	•	300 Feet	July 1975
2. DRINKING WATER (DESCRIBE)	YES Por	table Conta	300 Feet	_July 1975
3. TOILET FACILITIES	YES_		300 Feet	_July 1975
4. LAVATORIES	NO		,	
5. SHOWERS	NO			
6. DESCRIBE SEWAGE SY	STEM (IF OTH	ER THAN PUBLIC SE	wer) <u>Portable</u>	Toilets with waste
col	lected f	or offsite	disposal.	
		· ·		
G. WEIGHING AND MEASURI	NG FACILITIE	<u>s</u>		
1. SCALES		AT / A		
A. DESCRIPTION		N/A		
B. LOCATION		N/A	<u> </u>	· · · · · · · · · · · · · · · · · · ·
2. OTHER (SPECIFY)				
A. TYPE		N/A	·	
B. DESCRIPTION		N	/A	······································
C. LOCATION			N/A	
H. ENGINEER	•			•,
1. NAME Bruce A.	McCrodd	len .	3. REGISTRATION NUMB	12 m/80 00
	Box 428	orated ennsylvani	4. SIGNATURE 19061	ice a floodan
5. SEAL OF REGISTERED	PROFESSIONA	L ENGINEER		SEAL

PLAN OF OPERATION

SLUDGE LAGOON ELIMINATION

BP OIL, INCORPORATED

MARCUS HOOK REFINERY

Phase I.

Elected subcontractor to supply men and equipment to remove debris and obstructions from lagoon to facilitate Chemfix processing. Lagoon dikes on plant north and west do not have sufficient load bearing strength to support equipment. To circumvent any possibility of accidental breakage or spills, a system has been devised to avoid any contact with dikes. Debris consisting of a broken concrete ramp, some construction trash, and possibly sunken obstacles not detected by core probings, will be draglined to the stable south bank. A clamshell will remove the collected debris to sealed truck containers for haulage to landfill. Each truckload will be registered on the appropriate regulatory agency form and receipt will be documented by the permitted landfill. Disposal will be at KinBuc landfill in Edison, New Jersey, which is owned and operated by Eastern Industrial Incorporated.

Phase II

To be accomplished in conjunction with or shortly after
Phase I. The parking lot area due west of the lagoon will be
excavated to form a series of dikes to contain the Chemfix solids
for curing. On both the lagoon and disposal area sides, diking
will be arranged to collect any natural or liquid runoff in order
that it may be diverted to the refinery oily waste sewer system.

Plan of Operation - Sludge Lagoon Elimination, cont'd Page 2

All piping adjacent to or overspanning the creek will be double walled. Should accidental breakage occur, the discharge will flow back to the lagoon or to the water collection dike.

Phase III

During or following Phase II, two (2) Chemfix mobile process vans with supporting equipment will be positioned as shown on the site plot plan. Once the lagoon has been thoroughly agitated to provide a homogeneous slurry, Chemfix processing will begin. Chemfix on-site personnel will include a Technical Service Representative for the job duration to analyze both the raw waste and Chemfix end product. Complete analytical control will be maintained. Samples of the end product will be forwarded to our laboratory or BP's laboratory for confirming analyses. Also full time will be our Project Engineer who, in conjunction with BP's designated engineer, will supervise both the subcontractors' and our personnel. These safeguards against both technical or mechanical liabilities will ensure performance to the State's satisfaction.

Phase IV

At BP's request, the dike walls containing the end product will be limited in height to avoid any possibility of spills.

An average of two feet of freeboard will be maintained. This specification prohibits the entire processing of the lagoon at

Plan of Operation - Sludge Lagoon Elimination, cont'd Page 3

one time due to disposal area volume limitations. Chemfix will process until the disposal area is full, stop until the contractor removes the Chemfix solids, and then proceed to fill the disposal area again. This sequence will continue until all pumpable material has been removed from the Jagoon. Subcontractor(s) will be instructed to fill out the same forms to register truckloads and confirm receipt at landfill. It is expected that Chemfix solids will remain in the disposal area for a maximum of about 12-15 days before each haul-off sequence. Disposal of the Chemfixed material will be at Kinsley Landfill in Depthford, New Jersey, which is owned and operated by Eastern Industrial Incorporated.

Phase V

Upon completion of Phase IV, that material that was not pumpable, consisting mainly of oil-soaked soil, the top three inches of lagoon bottom silt, will be loaded out and hauled to landfill using the same precautions as covered in Phase I above. This material will be disposed at KinBuc Landfill in Edison, New Jersey, which is owned and operated by Eastern Industrial Incorporated.

COMMONWEALTH OF PENNSYLVANIA ER-BWQ-189.5AII:REV. 3/75 DEPARTMENT OF ENVIRONMENTAL RESOURCES WATER QUALITY MANAGEMENT

DATE PREPARED
4/29/77
DATE REVISED

MODULE 5A - PHASE II GROUND WATER QUALITY MONITORING INFORMATION ORIGINAL (Red)

FOR DEPARTMENT USE ONLY

CASE	ID	FN	TIF	ICA:	TION

	FOR DEPARTMENT USE ONLY
Name BP OIL INC Marcus Hook Refine	REVIEWED BY DATE
Municipality Trainer	RECOMMEND APPROVAL DISAPPROVAL
County Delaware	CONDITIONS
Permit No. 2376203	

NOTE:

Phase II must be completed within 60 days after the monitoring points are approved and the permit is issued.

- I. For approved monitoring sites complete the following:
 - A. Wells
 - 1. Location

MONITORING POINT	BACKGROUND OR	NAME DATE AND SERIES OF	MEASUF	CATION RED FROM ST CORNER	Southeast Corner N 1620 E 1550	
NUMBERS*	DOWN GRADIENT	TOPOGRAPHIC MAP	INCHES NORTH	INCHES WEST	Feet North	Feet West
1 .	Down Gradient	Impounding Pond	3.75	6.75	150	270
2	Inside Slurry Wall	Slurry Wall Detai	ls3.75	5.75	150	230
3]	ackground	Drawing S_1	-1.0	125	-40	-5
4	ackground	Oct. 11, 1976	8.875	-13.75	355	-550
. —	·					

^{*}Number all monitoring points consecutively. Example: Wells 1, 2, 3; Springs 4, 5, 6; Others 7, 8. These numbers must not be charged; they will be used in all subsequent reports and communications (use numbers only).

COMMONWEALTH OF PENNSYLVANIA ER-BWQ-189.5AII:REV. 3/75 DEPARTMENT OF ENVIRONMENTAL RESOURCES
WATER QUALITY MANAGEMENT

DATE PREPARED 4/29/77 DATE REVISED

MODULE 5A - PHASE II **GROUND WATER QUALITY** MONITORING INFORMATION **ORIGINAL** (Red)

FOR DEPARTMENT USE ONLY

Completion Data

MONITORING POINT NUMBERS*	METHOD DRILLED		DEPTH	SURFACE ELEVATION (PlantDatur	DEPTH TO STATIC WATER LEVEL	DATE OF MEASUREMENT
1	Auger	Feb.,1977	13.0	13.0	1.0	4/11/77
2	Auger	Feb., 1977	13.0	13.0	5.0	4/11/77
. 3			13.0	13.0	5.0	4/11/77
4	T	Feb.,1977	13.0	13.0	6.0	4/11/77

Completion Data Continued:

MONITORING	CASING:		GROUTING:			
POINT NUMBERS*	MATERIAL (TYPE)	SIZE DIAMETER (INCHES)	ZONES: CASED	ZONES PERFORATED	ZONES GROUTED	TYPE OF GROUTING
1	teelPipe	15	3Ft.	10 Ft.	N/A	N/A
2	teelPipe	15	3Ft.	10 Ft.	N/A	N/A
3	teelPipe	15	3Ft.	10 Ft.	N/A	N/A
4	teelPipe	15	3Ft.	10 Ft.	· N/A	N/A

a.	Does each well have a minimum of 3.5 inch diameter entrance port for samplers?	K)	YES	□ NO
b	If the entrance port is not provided, indicate how samples of the upper foot of ground water will be secured.			
	·			

^{*}Number all monitoring points consecutively. These numbers must not be changed; they will be used in all subsequent reports and communications (use numbers only).

COMMONWEALTH OF PENNSYLVANIA

ER-BWQ-189.5AII:REV. 3/75

DEPARTMENT OF ENVIRONMENTAL RESOURCES
WATER QUALITY MANAGEMENT

DATE PREPARED
4/29/77
DATE REVISED

MODULE 5A - PHASE II GROUND WATER QUALITY MONITORING INFORMATION ORIGINAL (Red)

FOR DEPARTMENT USE ONLY

3. Pump Test Data N/A

3. Pump lest Data N/A				
MONITORING POINT NUMBER	<u> </u>			- -
USE OF WATER OTHER THAN MONITORING (FIRE, DOMESTIC, . SANITARY FACILITIES, ETC.)				
PUMP	1		<u> </u>	
TYPE	<u> </u>			,
RATED CAPACITY		<u> </u>		
DEPTH TO PUMP (Ft.)	<u> </u>			
DEPTH TO WATER INTAKE (Ft.)				
PUMP TEST DATA	<u> </u>			
BAILED OR PUMPED AT (GPM-UNIFORM RATE)			·	
STATIC WATER LEVEL (PRIOR TO START OF PUMPING) (Ft.)				
PUMPING WATER LEVEL (AT END OF PUMP TEST) (Ft.)				
DRAWDOWN (Ft.)				
LENGTH OF PUMP TEST (Hrs.)	<u> </u>			
SPECIFIC CAPACITY (GPM/Ft.)				
<u>PUMPING RATE</u> DRAWDOWN				

a.	Are	the	required	geologic	logs	attached	for	each	well?
----	-----	-----	----------	----------	------	----------	-----	------	-------

	ES		NO
--	----	--	----

COMMONWEALTH OF PENNSYLVANIA ER-BWQ-189.5AII:REV. 3/75 DEPARTMENT OF ENVIRONMENTAL RESOURCES WATER QUALITY MANAGEMENT

DATE PREPARED
4/29/77
DATE REVISED

MODULE 5A - PHASE II GROUND WATER QUALITY MONITORING INFORMATION ORIGINAL (Red)

FOR DEPARTMENT USE ONLY

B. Springs

N/A

1. Locations

MONITORING	BACKGROUND		MEASURE SOUTHEAST	
POINT NUMBERS*	OR DOWN GRADIENT	NAME & DATE OF TOPOGRAPHIC MAP	INCHES NORTH	INCHES WEST

2. Flow Data

MONITORING POINT	ELEVATION OF DISCHARGE POINT	RATE OF FLOW GPM	DATE OF MEASUREMENT
	_		

C. Other(s)

N/A

MONITORING POING	DESCRIBE OR EXPLAIN	LIST PERTINENT INFORMATION (FLOW, DEPTH TO GROUND WATER, ELEVATIONS, ETC.

^{*}Monitoring point numbers should be numbered consecutively. Example: Wells 1, 2, 3; Springs 4, 5, 6; others 7, 8.

June 21, 1977

SUBJECT: Industrial Waste Permit

BP 0il Company

Trainer Borough, Delaware County

TO:

John Kennedy Sanitary Engineer

THRU: Walter E/(/Stanley Operations, Chief

FROM:

Paul M. Yaniga Geologist

AND

Richard L. Hinkle Facilities Chief

I have reviewed the Phase II module and monitoring well data and have the following comments:

- 1. Noted are marked down gradient increases in C.O.D., ammonia nitrogen, and alkalinity. Iron and manganese are also elevated in down gradient wells.
- Increases in alkalinity and ammonia would tend to indicate bio degradation 2. of organics when viewed in conjunction with the elevated C.O.D. value this would suggest current of past contamination by hydrocarbons.
- Subsequent analyses from these monitoring points should include oils 3. and grease.

Groundwater Section cc: Re Ce 30

PMY:smc

DATE PREPARED

CONTROL TO FENDAMENT DE SANGEMENT

QUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS

0प्रावस_{्य} (Red)

100 BE-48 MIN' ME DA. "

BP OIL INC.	COUNTY	DELAWARE
Institution PETROLEUM REFIN	ERY Municipality	TRAINER
onitoring point number/		
IMPOUNDING POND	···.	
pility Number		
Date rembre so, person	7 8 6 Time	BLOC TIME SYROW
Spring Rose_N/A Cu. R/sec.		
Depth to water best 28 test		
Sampling depth 60 feet		
Type of sample tractions: Pump	Bailer X	
Temperature (°C)		20.6
n h		77.3
Alkalinity (mg/L)	1 4	3 8 0
Chloride (mg/L)		40.4
Fluoride (mg/L)		0.9
Total Phosphates as P(mg/1	.)	0.06
K-Jeldahl Nitrogen (mg/L)		13.0
Fluorides thack one: 1. Colorina	tic Method or 2. Selec	tive ion grabe X
Metals these are: 1. Colorina	tric Method er 2. Atom	nic abnorption X
Warrana Mank Basinaan Jah		•
Marcus Hook Refinery Labor BP Oil Inc.	ratory	
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DATE	PA L'A	488	\neg
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	1	(Red)				
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mer Kere	BP OIL INC.	County DELAWARE	
	PETROLEUM REFINERY	Municipality TRAINER	•
niuring point numb			•
ility Blame	IMPOUNDING POND		
Hity Number			
Bet week so'be		(7 3 C	1078 ' 1700 Mar 1867 1878 1886 1867 1868 1868
Spring flow N/	& N=		
Docth to meter b	1 23 h		
Bompling depth	6.0		
Typ of whois G	act one Pumpbelor_	X	•
NH3 Nitrog	en (mg/L)	14.2	
Total Solid	is (mg/l)	410	
	Solids (mg/L)		•
Settleable	Solids	TRACE	•
BODS (mg/L)		118	
<u> </u>	(2CT2U7 (mg/L)	1130	•
Oil and Gre			
Photon check on		er 2. Scientive len probe X	
Wah ited on:		# 8. Atomic Shorption X	•
	4	A A MINING BAN PLOY	•
ere estre of t	borren priming fried sett	s :	
Marcus Hool	Refinery Laboratory	•	_
BP Oil Inc.			- :
D D B == 421	B, Marcus Hook, Pennsy	vanis 19061	

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MATER SUALITY BARASSES

CUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS

ORIGINAL

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BP OIL INC. County F PETROLEUM REFINERY Wunking	TRAINER
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	BALITY
nitering point number	•
IMPOUNDING POND	
ility Number	
	المجاري المسيدة المسيد
0m was missed C & 2 / 8 6 1mm	0730 ma too 8100
SER DIFF LB! SHLY	;
foring Row_N/A & N/A	
Dopth to water level 23 Cart	
Surpling depth 6.0 det	•
Typ of words that one: Pump bold_X	
Total Iron (vg/L)	NA
Aluminum (ug/L)	MA
Manganese (ug/L)	TIMA
	
Phobin sectors: 1. Colorinatic Masted = 2.	Y
Arsh Hed. ere: 1. Bolorinstric Method er 2.	Atomic shorption
re and eddrag of leboratory performing thermical analysis:	NA- NOT AVAILABLE
	• .
Marcus Hook Refinery Laboratory	
P.O. Box 428. Marcus Hook. Pennsylvania 19061	

DATE REVELD

COMMONSTALTH OF PERMSTLANDA CESSES CHALER CHALITY MANAGEMENT

QUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS

ORIGINAL (Red)

900 BE-48-MIN' NSI DA."

	••
BP OIL INC.	County DELAWARE
of Securitation PETROLEUM REFINERY	Municipality TRAINER
onitoring point number 2	
IMPOUNDING POND	
pility Number	
Dre unple solvered Dig 27 8	Tome 3735 may rome types
Spring Row N/A Cu. N/ac	
Depth to water book 3.5 that	
Sumpling depth fact	
Type of sample Crack one: Namp	X
Temperature (°C)	ఎఎ. 3
nh .	7.2
Alkalinity (mg/L)	43.0
Chloride (mg/L)	3.9
Fluoride (mg/L)	0.6
Total Phosphates as P(mg/L)	0.04
K-Jeldahl Nitrogen (mg/L)	2.2
Fluorides stack and: 1. Colorina tric Mathed	er 2. Saloctive den produc X
Metal these one: 1. Colorinatic Method	Z. Atomic Morphism X
Marcus Hook Refinery Laboratory	
BP Oil Inc.	
P.O.Box 428, Marcus Hook, Pennsylv	vania 19061

DATE MEYBED

MATER CHALITY MARAGEMENT

GUARTERLY AND ANNUAL CHEMICAL ARALYSIS FOR IMPOUNDMENTS

ORIGINAL (Red)

100 01.40. W. M. Do'.

BP OIL INC. THE STATE PETROLEUM REFINERY Lowitzing point number IMPOUNDING POND Bitty Number Bre week solbered 2 4 2 7 8 6 Age of the controls on the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the controls of the control of the controls of the controls of the controls of the controls of the controls of the control of the control of the controls of the control of the control of the control of the control of the controls of the control		TRAINER
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	.♥	BE In time
Boring Row N/A Eu RVIK		
Bopth EC water bod! 35 bit	٦	· ·
Sumpling depth	1	
Type of sample Grack are. Pump bailer_X	-	
NH3 Nitrogen (mg/L)		1.2
Total Solids (mg/L)		120
Suspended Solids (mg/L)		13
Settleable Solids	T R	PACE
BODS (mg/L)		1 (2
COD .25 N K2CT2U7 (mg/L)		132
		151.10
Oil and Grease (mg/L)	<u>د د</u> العدد العدد	
Florida deci ere: 1. Colorines is Mested		
Mean that one: 1. Colorinatic Method	# Z. Atom	ric Brogstian
The state of the s		
Marcus Hook Refinery Laboratory		
P.O.Box 428, Marcus Hook, Pennsylvar		

CBRASSES ET. CUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS TE BLYBED

URIGINAL (Red)

PD - BL'AS' WILL UNI DA. T

BP OIL INC.	DELAWARE
Type of Inscription PETROLEUM REFINERY	Municipality TRAINER
Monitoring point number 2.	·
FEIR NAME IMPOUNDING POND	
Facility Number	
0m was about 062736	7m 0735 mm
One work solvered 0 6 27 36	· · · · · · · · · · · · · · · · · · ·
Coing Res N/A Cu. R/C.	
Depth to water best 3.5 test	
Sumpling depth (c.O) that	
Type of sample Creat one: Pump	•
Total Iron (vg/L)	NA
Aluminum (ug/L)	ANI
Manganese (ug/L)	MA
For Maria dect ere: 1. Obrinetic Metal	or 2. Selective ion prote X
	er 2. Atomic shorption X
•	NA NOT AVAILABLE
Runs and soldness of laboratory parliaming draminal analysis:	INM LANGE TO SERVICE T
Marcus Hook Refinery Laboratory	
BP OII Inc.	
P.O. Box 428. Marcus Hook. Pennsylvania	19061

DATE PARPARED DATE REVELD

CHARGE SUALITY MANAGEMENT

QUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS

ORIGINAL (Red)

+04 DE . 45. MI 4. NOI DO . .

	^- :
Company Name BP OIL INC.	County DELAWARE
Type of Installation PETROLEUM REFINERY	Sunicipality TRAINER
Monitoring point number3	
Fasility Name IMPOUNDING POND	
Facility Number	
Dre whole Dia 7 8	7 2 C 3000 1 mm 31 mm
Spring flow N/A Cu. R/ac.	1 Galf A
Depth to eater level 4.8 test	
Sampling depth 10.0 that	Ħ
Type of sample Creek one: Pump builty_	<u>X</u>
Temperature (°C)	18.3
_n h	7 (
Alkalinity (mg/L)	/320
Chloride (mg/L)	
Fluoride (mg/L)	11013
Total Phosphates as P(mg/L)	0.02
K-Jeldahl Nitrogen (mg/L)	
	ar 8. Selective ten grabe X
	Z 2. Atomic sharption X
one and edition of laboratory performing decrical and	
Marcus Hook Refinery Laboratory	•
BP Oil Inc.	
P.O.Box 428, Marcus Hook, Pennsy	lvania 19061

DATE REVELD

CATER CHALLE WELLET OF BEST OF STREET

CLARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR EMPOUNDMENTS

ORIGINAL (Red)

10. 01.45. W. . NI D.'s

ery Kore _	BP OIL INC.	County	DELAWARE
•	PETROLEUM REFINERY	B unkipelit	TRAINER
ering point m			•
T Kons	IMPOUNDING POND		
Winter [
in was a		7 	T 2 L less time trans
pring flow	N/A & N=		
lepth EC este	· bai _ 4.8 bi		
	16.0		
	i fiel on . Amp bein	X	•
NH ₃ Nitt	ogen (mg/L)		0.2
الراحي المستراحي والمستراح	lids (mg/L).		1230
	d Solids (mg/L)	一一	1117
دا کمارید بازی پیداد است.	le Solids		NIL
BODs (mg			122
	N K2CT2U7 (mg/l)		
يوا فدوالا ميوم عاليا			
	Grease (mr/L)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	< 5 0
wien stact	•		•
e sheet he	re: 1. Goloringtik Metha	4 # Z. Am	mic Charption
	of Marrian paraming derival such		
	ook Refinery Laboratory	, 	
BP Oil In	الموالي باليام والتنفذ في بين من الموالي الموالية الموالية والموالية والموالية الموالية الموالية والموالية وال الموالية الموالية الموالية الموالية الموالية الموالية الموالية الموالية والموالية الموالية الموالية والموالية	اندورود کا بزی پیزادات	

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QUARTERLY AND ANNUAL EMEMICAL ANALYSIS FOR IMPOUNDMENTS

ORIGINAL (Red)

PD 01-40'ET 4' MI 04.7

Corpor Nove BP OIL	INC.	DELAWARE	
Type of Brestletion PETROL	EUM REFINERY	Municipality TRAINER	
Monitoring point number	_	•	•
Facility Rame IMPOUN			
Facility Number	1111		
		¥	
One work so'band	06278	(. Tom 0720 800 Tom 80	
Quing Row_ N/A	& N=		
Booth to eater bool	<u> </u>		·
Sorpling depth	- 4 -1		
Typ of surple Great one	Flomp beitr	X	
Total Iron (vg/L	.)	AM	
Aluminum (ug/L)		A LA	
Manganese (ug/L))		
			•
			•
			
For Pharisia sheet one:	1. Disimetic Vetas	er 2. Selective ten grets X	
For deah shed one:	1. Colorbratic Method	& 2. Atomic Gronzian	
	•	NA- NOT AVAILAG	Œ
Kims and address of laboratory	poterming themical statys		
Marcus Hook Refiner	rv Laboratorv		
BP OIL Inc.			
P.O. Box 428. Marcu	us Hook. Pennsylvania	19751	
	84 - 8 7	· ·	

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QUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR REPOUNDMENTS

ORIGINAL (Red)

	•		
BP OIL INC.	E&ATY	DELAWARE	
Pro of Installation PETROLEUM REFINERY	S Unkipolity_	TRAINER	
Monitoring point number		•	
IMPOUNDING POND			
acility Number			·
One work solvered () () () () 7 8	Town [0]	7 4 5 mers	ten ten Pallræm
Spring Row N/A Cu. R/ex			
Dopth to water level 3.1 feet	$\overrightarrow{\Box}$		
Sumpling depth 100 to:	Ħ		
Type of sample Grack one: Pump Seciler_	-li X		
		C. L.	
Temperature (°C)		9 . 4	•
Alkalinian		1.6	
Alkalinity (mg/L)	1/13	5.0	
Chloride (mg/l)	1/4	5.2	
Fluoride (mg/L)		0.5	
Total Phosphates as P(mg/L)	< 0	.01	
K-Jeldahl Nitrogen (mg/L)	0	.45	
r Fluorides d'est ens: 1. Colorinatic Mathed	er 8. Selection	A ten probe X	
Metals Stack one: 1. Belorinstric Method	er 2. Atomi	s discorption X	
Marcus Hook Refinery Laboratory	:	•	
PP Oil Inc.			•
P.O.Box 428, Marcus Hook, Pennsyl	vania 19061		•

DATE MEPARED

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GUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR REPOUNDMENTS

ORIGINAL ...

	BP OIL INC.	Conty	DELAWARE
pe of Jrosz letion	PETROLEUM REFINERY	S URISIDALITY	TRAINER
nitering point nu	<u>~</u>		•
ing Name	IMPOUNDING POND		
ility Number			
Bris servet so	المناس المستهام المساها المساها	V	7 4 5 mars : 60 m
Boring flow_]	I/A & N/K		
Dest to serie	bm! 81 br 1		
Surpling depth	10.0		
Type of surple	Brack one Pump boir_	X	
NH ₃ Nitro	gen (mg/l)	~	10.11
Total Sol	ids (mg/L)		570
	Solids (mg/L)		1119
Settleabl			MIL
BODS (mg/	(1)		1/2
(K2CT2U7 (mg/L)		13
	Grease (mg/L)	TIT	(5), (2)
Phoien fact	The state of the s	an 2 Saint	ties has areas X
Mah shed on			
ord eldra d	libertary parterning sharies states	58:	
Marcus Ho	ok Refinery Laboratory		
BP Oil In	c.		
P D Boy A	28, Marcus Hook, Pennsy	lvania 1906	1

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TA	21	VE	84	•	

QUARTERLY AND ANNUAL EMEMICAL ANALYSIS FOR IMPOUNDMENTS

ORIGINAL (Red)

BP OIL INC. PETROLEUM REFINERY	_County
# 67 Yesta Tation	Municipality TRAINER
nitering point number	0
IMPOUNDING POND	·
lity Number	
On what 6 4 2 7 8 6	1m 0 7 4 5 8078 60 50
N/A & N/E DIT USE ONLY	j
Bepth Co weter beet 3.1 but	
Surpling depth 10.0 test]
Typ of sample flect one: Pump beinX	
Total Iron (ug/L)	NA
Aluminum (ug/L)	NA
Manganese (ug/L)	11111
Photoin that are: 1. Colorinatic Mathed	er 8. Selective ten prote X
	er 2. Atomic sharption X
•	NA- NOT AVAILABLE
s and edition of libertary parterning Germical analysis:	1414 14
Marcus Hook Refinery Laboratory	
RP OII Inc.	
P.O. Box 428. Marcus Hook, Pennsylvania 19	

DATE PREPARED

DATE REVEED

CONTROL OF ENVIRONMENTAL BESOURCES

QUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS

ORIGINAL (Red)

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BP OIL INC.	DELAWARE
PETROLEUM REFINERY	
	Municipality TRAINER
Sonitoring point number	
IMPOUNDING POND	
ecility Number	
One whole 60'based 0 9 2 5 8	6 Parts 1 3 5 5 200 Per No. 000
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Spring Row N/A Cu. R/ex.	
Dopth to water bool 2.8 tes	
Sampling depth 10.0 fact	
Type of sumple Clast one: Ampbeiler_X	•
Temperature (°C)	20.6
n h	
Alkalinity (mg/L)	272.0
Chloride (mg/L)	56.8
Fluoride (mg/L)	0.6
Total Phosphates as P(mg/L)	0.15
K-Jeldahl Nitrogen (mg/L)	13.0
r Florida deck one: 1. Colorinatic Mathed	or 2. Selective ten probe .X
	or 2. Atomic sharption X
me and sold me of laboratory particularly district analysis.	
Marcus Hook Refinery Laboratory	•
BP Oil Inc.	

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BATE	Mar	ALD	7
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BATER BUALTY MARAGEMENT

QUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR EMPOUNDMENTS

ORIGINAL (Red)

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	BP OIL INC.		DELAWARE
e of Iron Lation	PETROLEUM REFINERY	Municipal t	TRAINER
vitering point pour	the		•
Uny More	IMPOUNDING POND		
lity Number			
Bre wyk w	ma 09258	16 100 T	355
Boring Now_N	/A & N=		
Depth to meter	ba! 2.8 bi		
Surpling depth	10.0		•
Tipe of words	fet or Pro bor	X	
NH ₃ Nitro	gen (mg/L)		13.0
	ids (mg/L)		480
	Solids (mg/L)		61
Settleabl		TIT	NIL
BODs (mg/	1)		
COD .25 N	K2Cr2U7 (mg/L)		170
-	rease (mg/L)		(5.0
Photos decl		2 2 2 2	ctive ison probe X
Made the tr	•		
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ed edine of	Morring stories such		·
Матсия Но	ok Refinery Laboratory	·	,
BP Oil In	С.		•
P.O.Boy 4	28, Marcus Hook, Pennsy	lvania 1906	

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THE REVELD

BUARTERLY AND ANNUAL CHEMICAL

ANALYSIS FOR IMPOUNDMENTS

DELAWARE

Corpory Name

BP OIL INC.

County

DELAWARE

Type of hearteston

PETROLEUM REFINERY

Municipality

TRAINER

Blonitering point number

Facility Number

Dru temple sollected

O 9 2 5 8 6 Tome / 3 5 5 Book Your Screen

Soring Ross N/A

Cu. R/SK.

Depth Ec series level 2.8 Seri

Sampling depth 10.0 Seri

	eer best fin	II OPFA
Spring Rom N/A	6. N=	
Dopth EG water level	8 - 1	
Serving depth 10,0	_ • :	
Typ of unpli that one:		<u>X</u>
Total Iron (vg/L))	NA
Aluminum (ug/L)		NA
Manganese (ug/L)		AM
•		
		l-d-d-d-d-d-
r Klaridin Ghack and:	1. Colorinesis Metro	d or 8. Soloctive bon probe_X
desk thek the:	1. Color Imetric Metho	d . Atomic shorten
	•	NA - NOT AVAILABLE
m and edding of laboratory	potenting themical met	· · · · · · · · · · · · · · · · · · ·
Marcus Hook Refiner	v Laboratorv	
BP 011 Inc.		
P.O. Box 428. Marcus	s Hook. Pennsylvani	a 19761
	94.8	·

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COMMUNICATION OF PENESTLYABIA COMMUNICATION OF ENVIRONMENTAL DESCRIPTION OF THE PROPERTY OF TH

QUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS

ORIGINAL (Red)

ANALYSIS FOR IMPOUNDMENTS

		·	
BP OIL INC.	County	DELAWARE	
Type of Installation PETROLEUM REFINERY	S unicipality	TRAINER	
Monitoring point number			
Pacific Mana IMPOUNDING POND			
Facility Number			
	Y		
One sample sollected 09258	6 Tame /	3 4 5 max time	An dec
Born Born N/A Bu D/m	- ONLY		
Spring flow N/A Eu. fl/exc.	 		
Depth to water level _2.8 test	11		
Sampling depth 64 feet			
Type of sample Creek one: Pump beiler_	X		
Temperature (°C)	2	3.3	
ph		7.0	
Alkalinity (mg/L)	8	4.0	
Chloride (mg/L)	1	4.4	
Fluoride (mg/L)		0.4	
Total Phosphates as P(mg/L)	0	1.118	
K-Jeldahl Nitrogen (mg/L)		1 . 7	
		Y X	
er Fluerides drack ene: 1. Colormete Method		ive ion prote X	
or Metals Great are: 1. Coloriments Method	# 2. Atom		
ions and editions of laboratory parterning themical analys	511.		•
Marcus Hook Refinery Laboratory		•	
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BP Oil Inc.		•	

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MATER SUALITY SANAGEMENT

GUARTERLY AND ANNUAL EMEMICAL ANALYSIS FOR PAPOUNDMENTS

ORIGINAL (Red)

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THE STATE LANGE	PETROLEUM REFINERY	Municipel (1)	TRAINER
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EN Kome	IMPOUNDING POND		
actity Number			
to work a		6 1 m /	3 4 5 mm tom 1100m
	1/A & N=		
Euroling depth	6.4		
Type of sumple	fat one Amo boile	X	
NH3 Nitro	ogen (mg/L)		1.3
Total So	lids (mg/l)		300
Suspende	Solids (mg/L)		160
Settleab	le Solids		0.1
BODs (mg/	<u>'L)</u>		11.0
COD .25 P	1 K2CT2U7 (mg/L)		35
Oil and (Grease (mg/L)		(5.0
er Phorism Sect	one: 1. Colorimetric Metho	zi == 2. &i=	stive ton grabe X
er Marsh Wast er	m: 1. Colorimetric Matthe	4 = 2. Ato	mic Charption X

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QUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS

100 01.40.Al -. NO! 0-'A

		•
BP OIL IN	ic.	County DELAWARE
PETROLEL	M REFINERY	TRAINER
itering point number	2	ı
IN Nove IMPOUNDI	NG POND	
lity Number		
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One work solked 0	40.017 41.0	
Spring Row N/A C		
Dopth to were tool _ 2.6		1
Surpling depth 6.4		=
	- Landandard	
Type of sample Great one:		_
Total Iron (ug/L)	_ .	
Aluminum (ug/L)		NA
Manganese (vg/L)		LINA
	÷	
	<u> </u>	
flucion sheck one:	 1. Colorinetic Vetad	er 8. Selective ion probe X
desh thed the	1. Coloriments Method_	er 2. Atomic shorption
	•	NA-NOT AVAILABLE
ed tides of identity pe	forming Semical Statyon:	NH-NOL MAILABE
Marcus Hook Refinery	Laboratorv	
•		
BP OIL Inc.		

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SEPARTMENT OF ENVIRONMENTAL RESOURCES MATER BUGLITY MANAGEMENT

QUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS

ORIGINAL (Fied)

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BP OIL INC.	County DELAWARE
Institution PETROLEUM REFINERY	Municipality TRAINER
onitaring point number3	
IMPOUNDING POND	
sility Number	
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Spring flow N/A Cu. fl/ssc.	1 ONLA
Depth to water level 6.7 test	一
Sampling depth 8,3 test	
Type of sample Grack one: Pump	_ ; X
Temperature (°C)	22.2
ph .	
Alkalinity (mg/L)	223.0
Chloride (mg/l)	16.2
Fluoride (mg/L)	0.3
Total Phosphates as P(mg/L)	0.41
K-Jeldahl Nitrogen (mg/L)	1.9
Fluorides thack one: 1. Colorinetric Method	er 8. Selective ten prede .X
	er 2. Atomic absorption X
•	
ne and address of leboratory parterning thermical analysis	33:
Marcus Hook Refinery Laboratory	•
BP Oil Inc.	
P.O.Box 428, Marcus Hook, Pennsyl	

DATE METARED

MATER BUALITY SANASIUSET

GUARTERLY AND AMMUAL CHEMICAL ANALYSIS FOR EMPOUNDMENTS

ORIGINAL (Red)

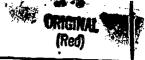
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	3 3 5	MOTE CONTRACTOR
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GUARTERLY AND ANNUAL EMEMICAL ANALYSIS FOR IMPOUNDMENTS



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BP OIL INC.	DELAWARE
of Institution PETROLEUM REFINERY	Municipality TRAINER
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INPOUNDING POND	
lity Number	
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90×90 F	FBI ONLY
Spring Row N/A Gu. R/sec	
Dopth to water level 6,7 test	44
Surpting depth	
Type of sumple Grack one: Pump boile	r <u>X</u>
Total Iron (yg/L)	NA
Aluminum (ug/L)	NA
Manganese (ug/L)	ANI
Mineral Annual A	and a Colombia transport X
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Marcus Hook Refinery Laboratory	•
BP 011 Inc.	
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QUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS

ORIGINAL (Red)

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pers Name BP OIL INC.		
DEST MATERIAL	County DELAWARE	
Installation PETROLEUM REFINERY	Sunicipality TRAINER	٠.
tering point number 4		
IMPOUNDING POND		
ity Number		
Dre umple sollected 09 25 8	6 Time 1405	10 (da 10 (da)
Boring flow N/A Gu. R/ac.	ear A	
Depth to water level 7.8 test	Ħ	
Sampling depth 9,4 that		
Type of whole Clack one: Pumpbuiler_X	 '	
Temperature (°C)	122.2	
ph	7.6	
Alkalinity (mg/L)	158.0	
Chloride (mg/L)	141.9	
Fluoride (mg/L)	0.3	
Total Phosphates as P(mg/L)	0.06	
K-Jeldahl Nitrogen (mg/L)	0.5	
	S. Selective ten probeX	
letals that the . 1. Belorimetric Method_	& 2. Atomic shorption^	
sel side of laboratory performing themical studyout): •	
Marcus Hook Refinery Laboratory		
BP Oil Inc.		

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CLARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS

ORIGINAL (Red)

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BP OIL INC.	Party DELAWARE
PETROLEUM REFINERY	Municipality TRAINER
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IMPOUNDING POND	
pility Number	
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Spring Row_N/A Cu R/A	
Booth EC water boot 7.8 but	
Surpling depth 9.4 test	
Type of surple Grack one Pump basier_	X
NH3 Nitrogen (mg/L)	< 0 . 1
Total Solids (mg/L).	530
Suspended Solids (mg/L)	28
Settleable Solids	0.1
BODS (mg/L)	
COD .25 N K2CT2U7 (mg/L)	122
Oil and Grease (mg/L)	NIL
r Fluorides shack one: 1. Colorimetric Metho	der 2. Selective Ion probe_X
	d er 2. Atomic ebergation_X
on and edition of libertony portaming thereins such	ren:
Marcus Hook Refinery Laboratory	
BP Oil Inc.	•
P.O.Box 428, Marcus Hook, Pennsy	ylvania 1906l

ANALYSIS FOR PROPOUNDMENTS ORIGINAL (Red) Company Name BP OIL INC. DELANARE DELANARE Company Name IMPOUNDING POND Facility Number Brit tample solvered O 9 25 86 Tome / 40 5 8000 Tome Britan Son part tall only Company Name Description of the same Son part tall only Son part tall only Son part tall only Son part tall only Son part tall only Son part tall only Type of sample Creek one: Facility Rumbar For Manyanese (ug/L) Manganese (ug/L) Manganese (ug/L) Manganese for detail of same in the probe X NA - Nor Avaicance Marcus Hook Refinery performing demical analyses: Marcus Hook Refinery Laboratory RP OII Inc. P.O. Box 428, Mercus Hook, Pennsylvania 1995.		QUARTERLY AND ANNUAL CHEMICAL - AMALYSIS FOR IMPOUNDMENTS			
ORIGINAL (Red) Company Rame BP OIL INC. DELAWARE Type of financiation PETRCLEUM REFINERY Standard Rambur W Facility Rame IMPOUNDING POND Facility Rambur By Standard Rambur Facility Rambur Soring Rose N/A Gu. R/Co. Depth EC serier level 2.8 Seri Sampling digits 9.9 Seri Type of semple Creek one: Pump basis X Total Iren (ug/L) Aluminum (ug/L) Manganese (ug/L) For Vileribia disch one: 1. Colorinebic Method w 2. Standard Rampilion X NA - Nor Available Karne and Statum of laboratory genforming dismissi analysis: Marcus Hook Refinery Laboratory RP OII Inc.	4			100 DI 20 20 20 20 20 20 20 20 20 20 20 20 20	
Company Marie BP OIL INC. Company Marie BP OIL INC. Type of brestriction PETRCLEUN REFINERY Ministering point number					
Type of finestilation PETRCLEUM REFINERY Shortering point number ### IMPOUNDING POND ### IMPOUNDING POND #### IMPOUNDING POND #### IMPOUNDING POND ###################################		•			
Type of finestilation PETRCLEUM REFINERY Shortering point number ### IMPOUNDING POND ### IMPOUNDING POND #### IMPOUNDING POND #### IMPOUNDING POND ###################################	Company Name	BP OIL INC.	County	DELAWARE	
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Berpting depth)#FA		•
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Manganese (ug/L) For Wherious sheet one: 1. Colorinetic Method or 2. Selective for probe X NA - Nor Avaicable Marcus Hook Refinery Laboratory BP 011 Inc.		•			
For Marcus Hook Refinery Endomatory BP 011 Inc.	Aluminur	n (ug/L)			
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	Marcus Ho	ook Refinery Laboratory			
P.O. Boy 428 Marcus Hook Popper Lines Lands	BP 011 11	nc.			r
	P O Par	428 Marcus Hook Barray	10061		

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QUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS

ORIGINAL (Red)

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BP OIL INC.	County DELAWARE
PETROLEUM REFINERY	Municipality TRAINER
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IMPOUNDING POND	
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Spring flow N/A Gu. R/ac Spring	1 out
Dopth to seter tool 3.4 test	1
Sampling depth 6.0 due:	Ħ
Type of sample Chart one: Pump bailer	X
Temperature (°C)	20.0
ph	6,9
Alkalinity (mg/L)	264.0
Chloride (mg/l)	44.8
Fluoride (mg/L)	6.2
Total Phosphates as P(mg/L)	<0.01
K-Jeldahl Nitrogen (mg/L)	1121.7
	or 2. Selective ten probe .X
•	6 or 2. Atomic absorption_X
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Marcus Hook Refinery Laboratory	
BP Oil Inc.	
P.O.Box 428, Marcus Hook, Pennsy	lvania 19061

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ORIGINAL (Red)

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BP OIL INC.	County DELAWARE
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Monitoring point pumber	
IMPOUNDING POND	
Papility Number	
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Boring flow N/A Gu R/ax	
Depth to eater twe! 3.4 Con	
Surpling depth 6.0 test	
Type of sample Great one. Pursu bailor	x
NH3 Nitrogen (mg/L)	12.7
Total Solids (mg/L)	380
Suspended Solids (mg/l)	
Settleable Solids	TRACE
BODS (mg/L)	14
COD .25 N K2CT2U7 (mg/L)	1120
Oil and Grease (mg/L)	
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	# 8. Atomic Shorption X
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Marcus Hook Refinery Laboratory	•
BP Oil Inc.	
P.O.Box 428, Marcus Hook, Pennsyl	

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CUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR REPOUNDMENTS

ORIGINAL (Red)

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BP OIL INC.	DELAWARE
Type of Inspiration PETROLEUM REFINERY	TRAINER TRAINER
Monitoring point number	•
IMPOUNDING POND	
Facility Number	
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Spring Row N/A & R/RC Depth Ecrester best 3.4 but	
Surpling depth 6.0 det	
Type of sumple Great one: Pump builty_X	
Total Iron (vg/L)	5280
Aluminum (ug/L)	I A E
Manganese (ug/L)	<u> </u>
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er dezh ishek ene: 1. Colorhenik Meshed e	~
form and solid new of laboratory porterming dramical analysis:	AE = ANALYTICAL ERROR
Marcus Hook Refinery Laboratory BP 011 Inc.	
P.O. Box 428. Marcus Hook. Pennsylvania 1906	
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CUARTERLY AND	ANNUAL CHEMICAL
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		(Red)	
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BP OIL INC.	COURTY DELAWARE
Per of Institution PETROLEUM REFINERY	Municipality TRAINER
Sonitaring point number 2	
IMPOUNDING POND	
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Spring Row N/A Cu. R/sx.	GATA
Dopth to serier best 3.9 test	Ħ
Sampling depth 6.0 ext	
Type of woods Great one: Pumpbuilds	X
Temperature (°C)	21.7
n h	6.9
Alkalinity (mg/L)	55.0
Chloride (mg/L)	3.1
Fluoride (mg/L)	2.9
Total Phosphates as P(mg/L)	< 0.01
K-Jeldahl Nitrogen (mg/L)	0.9
Phorism stack one: 1. Colorines is Mestad	_ er 2. Selective for grade .X
Metals that are: 1. Colorinate Method	2. Asomic sharption X
ा वर्ष स्टिन्स में स्टिल्स्स्य क्रमीयालेख स्थापन Marcus Hook Refinery Laboratory	n :
BP Oil Inc.	
P.O.Box 428, Marcus Hook, Pennsyl	vania 19061

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GUARTERLY AND ARHUAL SHEMICAL ARALYSIS FOR REPOUNDMENTS

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BP OIL INC.	SOME DELAWARE
PETROLEUM REFINERY	Municipality TRAINER
Bonitaring point number2	• · · · · · · · · · · · · · · · · · · ·
IMPOUNDING POND	
acility Number	
5n was 6's see 100 04 8	351m 0855 more to be
Spring Row_N/A Cu R/ax	
Burpling depth 6.0 det	
Typ of surple that one . Roman to be	. <u>X</u>
NH3 Nitrogen (mg/L)	0.40
Total Solids (mg/L)	90
Suspended Solids (mg/L)	
Settleable Solids	TRACE
BODS (mg/l)	
COD .25 N K2CT2U7 (mg/L)	115
Oil and Grease (mg/L)	< 5
o Fluorian stack are: 1. Colorinet is Meth	of 2. Science in prote X
	rud 8. Atomic Strongtion X
ers and section of the article and	Yes .
Marcus Hook Refinery Laboratory	
BP Oil Inc.	
P.O.Box 428, Marcus Hook, Penns	sylvania 19061

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CUARTERLY AND ARNUAL CHEMICAL ANALYSIS FOR POPOUNDMENTS

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BP OIL INC.	DELAWARE
Type of Personal PETROLEUM REFINERY	TRAINER TRAINER
Monitoring point number 2	•
Fair Nove IMPOUNDING POND	
Facility Number	
Spring flow N/A Co. N/M. Spring flow N/A Co. N/M. Depth Ecuster beet 3.9 bet Surpring depth 6.0 bet Typ of surple Grack one: Pump beiler X	Tom 0855 200 100 00
Total Iron (vg/L) Aluminum (vg/L) Manganese (vg/L)	600 AE
For Marking theck one: 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method 1. Colorinatic Method	
Marcus Hook Refinery Laboratory RP 011 Inc. P.O. Box 428. Marcus Hook, Pennsylvania 190	AE = ANALYTICAL ERROR
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Corpora Nove BP OIL INC.	County	DELAWARE
Tre of Institution PETROLEUM REFINERY	W unicipality_	TRAINER
Monitoring point number3		
Parity Name IMPOUNDING POND		
Facility Number		
8 m m m m m m m m m m m m m m m m m m m	5 m 08	3 3 5
Spring flow N/A Cu. ft/sec.		
Dopth to water best 6.3 test	†	· ·
Sampling depth 10.0 dest	Ħ	
Type of sample Great are: Pump bailer_	X	
Temperature (°C)	2	0.0
"h		7.6
Alkalinity (mg/L)	115	5.0
Chloride (mg/l)		11.15
Fluoride (mg/L)		11.18
Total Phosphates as P(mg/L)	1<10	. 0 1
K-Jeldahl Nitrogen (mg/L)		
	Control Control	- in any X
's Mah sted one: 1. Golovinskie Mestad	6. Assima	
Marcus Hook Refinery Laboratory	en:	•
BP Oil Inc.		
P.O.Box 428, Marcus Hook, Pennsyl	vania 19061	

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DATE REVELD	

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GUARTERLY AND ANNUAL CHEMICAL ARALYSIS FOR REPOUNDMENTS

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BP OIL INC.	Conty DELAWARE
Typ of Pres'usion PETROLEUM REFINERY	Municipality TRAINER
Monitoring point number	
IMPOUNDING POND	
Faility Number	
En wh s'end 110048	15 to 0835
Boring Now_N/A & Ru N/EX	
Depth to series beet 6.3 bes	
Bompting depth 100 test	
Type of surple that see . Pump bally_	X
NH3 Nitrogen (mg/L)	0.2
Total Solids (mg/L)	210
Suspended Solids (mg/L)	5
Settleable Solids	TRACE
BODS (mg/L)	
COD .25 N K2CT2U7 (mg/L)	20
Oil and Grease (mg/L)	< 5
er Florian stack one: 1. Colorines is Method	2. Soloctive ten prote X
or Mak thed. one:	2. Atomic sharption X
Marcus Hook Resinery Laboratory	
BP Oil Inc.	
P.O.Box 428, Marcus Hook, Pennsy	lvania 19061

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CUARTERLY AND ANNUAL CHEMICAL ANALYSIS FOR IMPOUNDMENTS

ORIGINAL (Red)

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BP OIL INC.	DELAWARE
PETROLEUM REF	INERY TRAINER
vitoring point number3	
IMPOUNDING PO	OND
lity Number	
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Spring Row_N/A Cu. R/ac.	
Dopth to eater best 6.3 for	
Sampling depth 10.0 that	
	Ania V
Type of surple free one: Ame	
Total Iron (vg/L)	31140
Aluminum (ug/L)	<u> </u>
Manganese (vg/L)	< 10
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Author that the: 1. Obb	rinetic Method or 8. Selective by probe_X
death sheet greet 1. Gold	rimente Method er 2. Atomic chargelon
•	AE = ANALYTICAL ERROR
and states of latertary potential	firmical statem:
Marcus Hook Refinery Labora	TOPV
RP OII Inc.	
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	(Red)	
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BP OIL INC.	DELAWARE DELAWARE
Type of Sneed Section PETROLEUM REFINERY	Municipality TRAINER
Manitering point number 4	•
Parity Name IMPOUNDING POND	
Restiny Number	
0 m m m m m m m m m m m m m m m m m m m	5 m 0905 m 1 m 1 m
Spring flow N/A Cu. R/sc.	
Depth to seter level 7.6 test	Ħ
Sampling depth 10.0 dest	
Type of sumple Great one: Pump beiler_	X
Temperature (°C)	2 1 1
nh	7.4
Alkalinity (mg/L)	1107.5
Chloride (mg/L)	93.3
Fluoride (mg/L)	1 2 2
Total Phosphates as P(mg/L)	
K-Jeldahl Nitrogen (mg/L)	
	S or S. Selective ten protes_X
Metal Stack era: 1. Colorinatic Metal	S Gr 2. Atomic shorptionX
one and exists of Macroon parlaming Genical analy	
Marcus Hook Refinery Laboratory	•
BP Oil Inc.	
P.O.Box 428, Marcus Hook, Pennsy	lvania 19061
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BATER CHALTE MANAGEMENT

CUARTERLY AND ANNUAL EMEMICAL ARALYBIS FOR IMPOUNDMENTS ORIGINAL (Red)

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ه م	tering point our	·	4			•
ا ح	nj Name	IMPOUNDI	NG POND			
D ''	ty Number					
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	Boring Now_N			1 90'4		•
	Burpting depth		•			
1	ten of maje	tal m	Promp beile	X		•
•	NH3 Nitro	gen (mg/L	<u>)</u>	<0	.01	
•	Total Sol	ids (mg/L	<u>)</u> :		327	
•	Suspended	Solids (mg/l)		5	
Œ	Settleable	e Solids	= >		NIL	
Œ	BODS (mg/)	L)	-		2	
•	COD .23 N	K2CT2U7	mg/L)			•
_	Oil and G	rease (mg	<u>/</u> L)		< 5	
F	well fuct		1. Colorimet k Meth	# = 2. L 'eni	ive ton protocol	
	4 2h thed one	ı:	1. Colombia Mith	d # 8. Atom	ic Strongton_X	-
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		•	forming thermical and			
	Marcus Hoo	ok Refine:	ry Laboratory		•	•
	BP Oil Inc					•

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CUARTERLY AND ANNUAL EMEMICAL ANALYSIS FOR EMPOUNDMENTS

ORIGINAL (Red)

BP OIL INC.	DELAWARE
	SUREINSTR TRAINER
Monitoring point number	
FINE IMPOUNDING POND	
Facility Number	
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100485	Tone 0905 800 7000 81000
Spring Row N/A Cu. R/M	
Depth &c weter best 7.6 that	
Surpring depth 10.0 dest	
Typ of whole that one: None being X	
Total Iron (vg/L)	1750
Aluminum (ug/L)	AE
Manganese (ug/L)	< 10
For Pharia deck one: 1. Colorine via Mated 6	2. Selective dan grade X
For deah that one: 1. Colorinate Method a	2. Atomic chargetion X
•	AE = ANALYTICAL ERROR
Kerns and editions of leberatory parterning Germical analyses:	
Marcus Hook Refinery Laboratory	
RP OII Inc.	
P.O. Box 428. Marcus Hook, Pennsylvania 190	<u> </u>
84.8	

BP SLUDGE POND RECLAMATION SLUDGE POND CORE BORING ANALYSIS

Boring	JGRA Sample P	Percent Percent	Percent Ash		Percent Oil*		
No.	No.	Moisture	Solids	•Wet Basis	Dry Basis	Wet Basis	Dry Basis
1(0'-11')	0036	63.59	36.41	16.41	45.08	7.83	21.51
1(11'-18'	0037	58.92	41.08	22.12	53.85	6.32	15.38
1(18'-20'	0038	47.28	52.72	45.54	86.38	0.82	1.55
3 (0'-8')	.0046	67.96	32.04	16.10	50.25	3.69	11.51
5(0'-11')	0039	61.15	38.85	30.37	78.18	12.25	31.53
7 (0'-8')	0040	61.78	38.22	24.58	64.31	8.63	22.59
0(0!-7!)	0041	62.91	37.09	19.79	53.35	10.59	28.55
2(0'-10')	0042	59.29	40.71	30.31	.74.46	2.09	5.14
3(0'-8')	0043	69.41	30.59	17.23	56.32	5.88	19.22
4(0"-8")	0044	64.38	35.62	24.59	69.04	4.40	12.36
5(0'-8')	0045	42.49	57.51	43.39	75.45	1.56	2.71

E- 4.0

Hexane Extractable Material

Boring	JGRA Sample	Copper		% By Weight Iron		Lead	
No.	No.	Wet Basis	Dry Basis ^l	Wet Basis	Dry Basis	Wet Basis	Dry Basis
#1 '-11')	0036	.018	.1096	1.12	5.825	.13.0	.6700
1(11'-18')	0037	.022	.0995	2.40	10.850	.208	.9400
1(18'-20')	0038	.004	.0088	2.32	5.094	.060	.1317
3 (-8')	0046	.023	.1429	1.44	8.944	.186	1.155
5(0'-11')	0039	.022	.0724	1.36	4.478	.180	.5927
7(0'-8')	0040	.016	.0651	2.40	9.764	.182	.7404
0 (0'-7')	0041	.009	.0455	1.44	7.276	.096	.4851
2 (0'-10')	0042	.022	.0726	1.84	6.071	.192	.6335
3(0'-8')	0043	.018	.1045	4.64	26.930	.180	1.045
4 (0 '-8 ')	0044	.031	.1261	2.96	12.037	.176	.7157
.6(0'-8')	0.045	.040	.0922	2.72	6.269	.200	.4609

l. Dry Basis computations based on weight of ash in sample.

Page 2 of 5

Boring	JGRA Sample Nickel		cel	% By Weight Calcium		Vanadium	
No.	No.	Wet Basis	Dry Basis ¹	Wet Basis	Dry Basis	Wet Basis	Dry Basis
#1(0'-11')	0036	.003	.0183	2.420	14.75	.005	.0304
1(11'-18')	0037	.012	.0542	.456	2.061	.005	.0226
1(18'-20')	0038	.005	.0109	.126	.2767	.002	.0044
(0,1-81)	0046	.004	.0248	.282	1.752	.007	.0435
5(0'-11')	0039	.006	.0198	.212	.6981	.006	.0198,
7(0'-8')	0040	.003	.0122	.017	.0692	.005	.0203
10 (0'-7')	0041	.037	.1870	.190	.9601	.003	.0152
12(0'-10')	0042	.005	.0165	.238	.7852	.007	.0231
13(01-81)	0043	.006	.0348	.602	3.494	.002	.0116
14(0'-8')	0044	.009	.0366	.192	.7 808	.005	.0203
16(0'-8')	0045	.008	.0184	.368	.8481	.013	.0300

[.] Dry Basis computations based on weight of ash in sample.

Page 3 of 5

Boring	JGRA Sample	c1	fur	_	Weight		
No.	No.	Wet Basis	Dry Basis ¹	Wet Basis	ssium Dry Basis	Wet Basis	dium Dry Basis
- 						——————————————————————————————————————	DRS LS
#1(0'-11')	0036	.610	3.717	.080	.4875	.060	.3656
1(11'-18')	0037	1.370	6.193	.128	.5787	1.120	5.063
1(18'-20')	0038	.380	.8344	.166	.3645	.128	.2811
(°8-1	0046	1.030	6.398	.074	.4596	.184	1.143
5(0'-11')	0039	.470	1.548	.061	.2009	.136	.4478
7(0'-8')	0040	.520	2.116	.093	.3784	.096	.3906
10(0'-7')	0041	.230	1.162	.058	.2931	.264	1.334
12(0-10')	0042	.760	2.507	.117	.3860	.512	1.689
13(0'-8')	0043	.920	5.340	.054	.3134	.104	.6036
14(0'-8')	0044	.190	.7727	.072	.2928	.064	.2603
16(0'-8')	0045	1.130	2.604	.107	.2466	.384	.8850

Dry Basis computations based on weight of ash in sample.

			BTU/P	OUND
· · ·	Boring No.	JGRA Sample No.	Wet Basis	Dry Basis
·	#1(0'-11')	0036	3300.	20103.
	1(11'-18')	0037	2890.	13065.
. *	1(18'-20')	0038	830.	1822.
	3(0'-8')	0046	NIL ²	
	5(0'-11')	0039	4120.	13566.
	7(0'-8')	0040	3300.	13426.
	10(0'-7')	0041	2060.	10409.
	12(0'-10')	0042	NIL ²	•
	13(0'-8')	0043	NIL ²	
	14(0'-8')	0044	2060.	8377.
	16(0'-8')	0045	3300.	7605.
	16(0'-8')	0045	3300.	7605.

- 1. Dry Basis computations based on weight of ash in sample.
- 2. Sample would not sustain combustion.

Page 5 of 5

E-4.0.4

ORIGINAL

(Red) 505 McNeilly Rd. Pittsburgh, Pa. 15226 Telephone: (412) 343-8611

June 20, 1975

Commonwealth of Pennsylvania
Department of Environmental Resources
Region 1
1875 New Hope Street
Norristown, Pennsylvania 19401

RE: British Petroleum Company Marcus Hook, Pennsylvania Phase-Out of API Waste Lagoon

Gentlemen:

Chemfix, Inc., a Pennsylvania corporation, has been contracted by British Petroleum, Marcus Hook, Pennsylvania, to select subcontractors, implement a lagoon phase-out program, chemically-fix approximately 3.5 million gallons of API waste, and dispose of end products at state-approved landfills. Program scope includes an analytical survey of the waste and its reactivity with the Chemfix process; removal of trash and debris to state-approved landfills; construction of a diking system to direct all natural runoff to the plant oily waste sewer system during field work; and, upon disposal of the non-toxic, non-polluting Chemfix solids, restoration and contouring of the area to natural grade. Estimated starting date of the program will be on or about July 14, 1975.

Supporting analytical data and site plans locating the lagoons and the disposal area are included as Addendums. Project scope will be completed in five (5) phases as described in Addendum I.

We understand that this lagoon phase-out is a condition of British Petroleum's valid industrial waste permit. We are presenting this phase-out program summary and supporting documents for your review. We would appreciate a letter confirming that the program is acceptable.

THE ULTIMATE WASTE DISPOSAL PROCESS AND SERVICE

June 20, 1975

Commonwealth of Pennsylvania Department of Environmental Resources Region 1 1875 New Hope Street Norristown, Pennsylvania 19401

RE: British Petroleum Company Marcus Hook, Pennsylvania Phase-Out of API Waste Lagoon

Page 2

Subcontractors are now submitting bids for depositing the various end products in state-approved landfills. Lagoon debris and inert Chemfix solids are expected to be hauled to an approved landfill(s) in either Pennsylvania or New Jersey, depending on the bids. Lagoon bottom silt will be hauled to an approved landfill in New Jersey. We would appreciate a letter confirming that these landfills (noted in Addendum III) are acceptable.

Thank you for your attention and concern.

Sincerely,

Ronald J. Polosky Technical Director

RJP/cks Attachments

cc: B. McCrodden, British Petroleum

LIST OF ADDENDUMS

I.	Program Summary	-	Details the five phases of work and highlights environmental safeguards.
II.	Site Plot Plan	-	Describes lagoon, piping, processing van locations, impounded solids discharge area, and diversion dikes.
111.	Prospective Landfills	-	State approved landfill sites in either Pennsylvania or New Jersey from which bids have been solicited for (1) lagoon debris, (2) Chemfix solids as intermediate/secondary cover, and (3) lagoon bottom silt. Copies of available approval documents have been included.
IV.	Chemfix Solids Leaching Data	-	Results of an accelerated leaching test on an actual sample of Chemfix treated BP lagoon sludge confirm the non-toxic, non-polluting nature of the Chemfix solids.
v.	Recommendations for Loading and Hauling Chemfix Solids	-	To be included in bid specifications to subcontractors.
VI.	Chemfix Landfill Improvement Patent (#3,841,102)	-	Describes the use of Chemfix solids as an improvement media in sanitary landfills.
VII.	Use of Chemically-fixed Solids as Sanitary Landfill Cover Material	-	A technical report that confirms that Chemfix solids behave like natural soil in sanitary landfill situations.
VIII.	Ultimate Disposal Methods of Refinery Sludges	-	A survey which includes Chemfix refinery waste experience.



ADDENDUM I

Program Summary

Phase I

Elected subcontractor to supply men and equipment to remove debris and obstructions from lagoon to facilitate Chemfix processing. Lagoon dikes on plant north and west do not have sufficient load bearing strength to support equipment. To circumvent any possibility of accidental breakage or spills, a system has been devised to avoid any contact with dikes. Debris consisting of a broken concrete ramp, some construction trash, and possibly sunken obstacles not detected by core probings, will be draglined to the stable south bank. A clamshell will remove the collected debris to sealed truck containers for haulage to landfill. Each truckload will be registered on the appropriate regulatory agency form and receipt will be documented by the permitted landfill.

Phase II

To be accomplished in conjunction with or shortly after Phase I. The parking lot area due west of the lagoon will be excavated to form a series of dikes to contain the Chemfix solids for curing. On both the lagoon and disposal area sides, diking will be arranged to collect any natural or liquid runoff in order that it may be diverted to the refinery oily waste sewer system. All piping adjacent to or overspanning the creek will be double walled. Should accidental breakage occur, the discharge will flow back to the lagoon or to the water collection dike.

Phase III

During or following Phase II, two (2) Chemfix mobile process vans with supporting equipment will be positioned as shown on the site plot plan. Once the lagoon has been thoroughly agitated to provide a homogeneous slurry, Chemfix processing will begin. Chemfix on-site personnel will include a Technical Service Representative for the job duration to analyze both the raw waste and Chemfix end product. Complete analytical control will be



maintained. Samples of the end product will be forwarded to our laboratory or BP's laboratory for confirming analyses. Also full time will be our Project Engineer who, in conjunction with BP's designated engineer, will supervise both the subcontractors' and our personnel. These safeguards against both technical or mechanical liabilities will ensure performance to the state's satisfaction.

Phase IV

At BP's request, the dike walls containing the end product will be limited in height to avoid any possibility of spills. An average of two feet of freeboard will be maintained. This specification prohibits the entire processing of the lagoon at one time due to disposal area volume limitations. Chemfix will process until the disposal area is full, stop until the contractor removes the Chemfix solids, and then proceed to fill the disposal area again. This sequence will continue until all pumpable material has been removed from the lagoon. Subcontractor(s) will be instructed to fill out the same forms to register truckloads and confirm receipt at landfill. It is expected that Chemfix solids will remain in the disposal area for a maximum of about 12-15 days before each haul off sequence.

Phase V

Upon completion of Phase IV, that material that was not pumpable, consisting mainly of oil-soaked soil, the top three inches of lagoon bottom silt, will be loaded out and hauled to landfill using the same precautions as covered in Phase I above.

The above Phases have been formulated based on our experience both in the field with jobs of similar scope, and in complying with regulatory requirements in seventeen (17) different states and with Federal E.P.A. requirements. British Petroleum recognizes its duty as a company to ensure compliance and to safeguard the environment.

ADDENDUM III

Prospective Landfill Sites

PENNSYLVANIA

Knickerbocker Landfill Paoli

Ec

or

Lan-Chester Landfill Honeybrook

or

Gross Landfill Morrisville

Chemfix Solids (as intermediate or secondary cover)

Lagoon Debris

Knickerbocker Landfill Paoli

or

Lan-Chester Landfill Honeybrook

or

Gross Landfill Morrisville

3. Lagoon Bottom Silt

None

Kin-Buc, Inc. Meadow Road Edison Township Middlesex County

Route 41

Kin-Buc, Inc. Meadow Road Edison Township Middlesex County

Kinsely's Landfill, Inc.

Deptford Township Gloucester County

ADDENDUM IV

Chemfix Solids Leaching Data

BRITISH PETROLEUM COMPANY

Marcus Hook, Pa.

SW: 844-F75

Preliminary Leaching Study

LAB LEACHATE OF 6/9/75 LABORATORY CHEMFIX PRODUCT

•		Inches of Leachate Water ^O				
Constituents	Raw Sludge	0-25"	<u>25-50</u> "	<u>50-75</u> "	<u>75-100</u> "	
Cadmium (Cd)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Total Chromium (Cr)	45	< 0.10	< 0.10	< 0.10	< 0.10	
Copper (Cu)	38	< 0.25	< 0.10	< 0.10	< 0.10	
Iron (Fe)	3400	< 0.25	< 0.10	< 0.10	< 0.10	
Lead (Pb)	46	< 0.25	< 0.10	< 0.10	< 0.10	
Nickel (Ni)	17	< 0.50	< 0.10	< 0.10	< 0.10	
Zinc (Zn)	350	< 0.10	< 0.10	< 0.10	< 0.10	
Phenol (0) and related	4.0	< 0.25	< 0,10	< 0.10	< 0.10	
Cyanide (CN) and related	< 0.25	< 0.25	< 0.10	< 0.10	< 0.10	
Chemical Oxygen Demand (COD)	21,000	3600	2600	2300	1800	
· · · · · · · · · · · · · · · · · · ·						

All Results in ppm

< = Less Than

The above data is supplied for information purposes only. Since raw wastes vary considerably, other samples of this waste may yield somewhat different results.

 $^{^{\}rm O}$ = Each 25" of leachate represents approximately 800cc of distilled water

ADDENDUM V

Recommendations for Loading and Hauling Chemfix Solids

- While the physical properties of Chemfix solids depend on the waste treated and the amount of Chemfix reagents added, normal Chemfix solids will behave like natural soils, from silt to clay. Often, clients will ask that additional amounts of reagents be added for harder solids, with unconfined compressive strengths exceeding 5 T/ft². Chemfix solids will also behave like soil in that they may become somewhat dusty in very dry weather or somewhat muddy in very wet weather.
- 2. When loading Chemfix solids, it is recommended that equipment work from the natural soil areas surrounding Chemfix impounded discharge areas. This allows operators to work on material that they are completely familiar with. Good results have been obtained in loading by large backhoes, which dip into the as-cast solids and deposit them into hauling trucks.
- 3. In any case, the loading equipment should move to the Chemfix solids. The Chemfix should not be herded or pushed about unnecessarily in the disposal area; Chemfix solids are often impounded in low wet areas which may muddy if disturbed.
- 4. During very wet weather, it may be advantageous to pile up Chemfix solids before loading into hauling trucks to allow impounded rain water to drain.
- 5. Plastic or dirt should be used to minimize leakage of trace water from hauling truck tailgates.
- 6. C-clamps or "boomer chains" on the truck tailgates will help to prevent leakage of trace water. They will also prevent tailgates from accidently opening during transport to landfill.
 - 7. When dumped at the landfill, the Chemfix solids should be dumped as close as possible to their final resting place to minimize landfill handling costs. Best results are obtained when solids are allowed to sit undisturbed for one day to a week before subsequent movement.





P.O. BOX 364
 EAST CHICAGO, INDIANA 46312
 PHONE:
 218-949-0561

SPECIFICATIONS

SLURRY CUTOFF WALL VIBRATING-BEAM INJECTION METHOD

SECTION SCOPE

This section of the Specification includes requirements for the vibrating beam injection slurry cutoff wall, as hereinafter specified or as required to properly complete the WORK:

1. GENERAL

- 1.1 A vibrated beam slurry wall shall be constructed to the lines, grades, and cross sections as indicated on the drawings. Wall shall be essentially vertical. An approved slurry mixture shall be pumped under controlled pressure through the underlying stratas and keyed into an impervious material.
- 1.2 The Contractor will be required to submit evidence that he is competent to construct a slurry wall. This evidence will insure that the Contractor or his subcontractor will have sufficient competent personnel to carry out the operations specified, and such personnel (as approved by Purchaser prior to award of Contract) will have previous experience in this type of construction. In particular, a construction and slurry specialist (s) shall be used to supervise the construction, slurry preparation, and quality control.
 - 2. DRIVING AND EXTRACTION OF VIBRATING BEAM

2.1 Equipment:

- a. The slurry wall shall be constructed using suitable equipment for attaining required depth and continuity of the wall.
- b. Vibrating beam shall have a web depth of 20 to 33 inches and a flange width of 10 to 15 inches. Beam shall be controlled by guide leads assuring plumbness in vertical plane within the limits of + 1% and each insertion shall overlap previous insertion be a minimum of 10% of beam depth.





c. Beam shall be inserted by vibratory driver at maximum rate and extracted at the rate of 3m per minute. Pumping pressure of slurry shall be as such to maintain a trench level and full around the beam during extraction. Beam shall be "Keyed" into clay or terminated at the top of an impervious rock-like strata.

2.2 Installation of Slurry Wall

- a. Contractor shall construct a suitable working area on top of dike to provide free mobility of equipment and at all times maintain stability and appearance of dike embankment during construction of slurry wall. Any damage to the dike shall be immediately repaired to the satisfaction of Purchaser. This applies if design specifies slurry wall through the dike.
- b. Driving and extraction of vibratory beam and introduction of slurry into the pervious soil shall begin after construction of dike, providing design specifies slurry wall from the top of dike. Crane with vibrated beam insertion equipment shall travel along the top of the dike. All other support equipment shall travel along the toe of the slope or on top of dike preceding or following crane.
- c. The complete slurry wall shall be plastic and continuous with no gaps and shall have a minimum thickness of 3 inches or less depending on seepage requirement.

3. SLURRY

- 3.1 Slurry shall consist of a stable colloidal suspension of pulverized natural sodium-cation bentonite and cement in water.
 - a. Bentonite: High quality pulverized natural sodium-cation material. A written certification shall be supplied specifying the quality per each load shipment of bentonite received. Additives, if any, must be as approved by Consulting Engineer.
 - b. Bentonite shall comply with American Petroleum Institute Standard 13A Sec. 3,5,6, & 7, with the following exceptions:
 b.l.1. Elimination of the yield point plastic viscosity relationship.
 - b.1.2. Use 28 grams of clay instead of 22.5 grams.

c. Cement: Portland Cement ASTM C150 type 1 or 1-S. A written certificate specifying cement quality shall be given by cement supplier for each tank load shipment of cement received.

3.2 Slurry Requirements

- a. At time of injection, slurry for walls shall meet the following requirements:
- al. Permeability of not more than K=10-7 cm/sec. or less than K=10-6 cm/sec.
- a2. Viscosity of not less than 35 marsh cone seconds in accordance with API RP-13B.
- a3. Minimum slurry mixture temperature shall be 450 F.
- a4. Yield of not less than 70 bbl. of 15 cp mud per ton of Bentonite.
- a5. The water loss shall not be greater than 50 cubic centimeters in 20 minutes at 50 psig when tested in accordance with "Low Temperature Filtration Test" API RP-13B.
- a6. The specific gravity of the slurry shall not be less than 1.07 gm per cubic centimeter, nor greater than 1.5 gm per cubic centimeter or as approved by the Consulting Engineers.
 - b. Contractor shall be responsible for meeting all above requirements. Completed wall sections failing to meet these requirements shall be repaired immediately to the satisfaction of the Purchaser.
- 3.3 Contractor shall submit a written statement as to the use of any additional admixtures, such as retarders, and its effect on the slurry mixture prior to its use.
- 3.4 Slurry shall be pumped from centrally located mixing plant to a holding tank equipped with a constant agitator only after bentonite cement mix has been fully hydrated as determined by Purchaser.

4. MIXING PLANT:

a. All slurry for vibrating beam injection shall be mixed in a colloidal continuous mixing. Mixing of water, bentonite, and cement shall continue until bentonite particles are fully hydrated and resulting water, cement and bentonite slurry is homogenous.





b. Slurry plant shall include necessary equipment including a mixer capable of producing a colloidal suspension of bentonite and cement: sumps, pumps, valves, hoses, supply lines, small tools, and all other equipment as may be required to adequately supply slurry to storage tank.

5. WATER

Water shall be clean, fresh, and free from oil, acid, alkali, organic matter, or other deleterious substances. Contractor shall supply all the required water. Contractor is responsible for changes in the water chemistry and its effect on the cement-bentonite mixture.

- 5.1 Laboratory slurry mix design shall be submitted to Purchaser or Purchasers Representative prior to construction of slurry wall start up.
 - 6. TREATMENT OF TOP OF SLURRY WALL
- 6.1 Whenever temperatures are anticipated to be 320 F or less, suitable cover, as approved by Purchaser's Representative, shall be placed over the slurry wall to prevent freezing.
 - 7. LABORATORY FOR SLURRY TESTING
- 7.1 Contractor shall have portable laboratory on the project.
- 7.2 Qualified person shall manage and operate laboratory.
- 7.3 At least two times per shift, tests shall be conducted to prove to Purchaser or Consulting Engineers that mixed slurry shall meet all requirements as outlined under 3.1 Slurry & 3.2 Slurry Requirements.





BP OIL INC.

P. O. BOX 428, MARCUS HOOK, PA. 19061 PHONE (215) 494-360

November 29, 1976

TELEX 83-472

RECEIVED

DEC 2 1976

English Sections WALLS CHARTE THE SECTION MORMISTOVIH REGIONAL OFFICE

Mr. Dave Milhous Sanitary Engineer, PaDER 1875 New Hope Street Norristown, Pennsylvania 19401

Re: Impounding Pond Permit Application

Dear Mr. Milhous:

As you requested, additional information concerning the proposed slurry wall for the refinery's impounding pond is included. The areas in which you expressed concern were:

- 1) Will the Bentonite slurry mixture react adversely with the oil likely to be present in the groundwater or in the impounded water?
- 2) What is the expected permeability of the slurry wall?

Laboratory testing was performed on surface and sub-surface groundwater, water to be impounded, and water from Marcus Hook Creek to determine respective reactions with the Bentonite. Attached are copies of letters from Slurry Systems Specialists, Incorporated, the installation contractor, and International Minerals and Chemical Corporation, the testing Laboratory, assuring the suitability of the proposed Bentonite mixture.

The permeability of the proposed slurry wall will be 10⁻⁷ cm/second.

Your cooperation in expediting the above referenced application is sincerely appreciated. It is hoped the information supplied herein will be sufficient to allow

Mr. Dave Milhous

November 29, 1976

Re: Impounding Pond Permit Application

final approval of the permit application.

Very truly yours,

BP OIL, Incorporated

M. A. Pappas

Refinery Manager

FPP:rl

Attachment

Slurry Systems Specialists. Inc.



CONTRACTORS & CONSULTANTS

November 23, 1976

P.O. BOX 364
 EAST CHICAGO, INDIANA 46312

 PHONE: 219-949-0561

J. E. Brenneman 211 South Broad St. Philadelphia, Pa. 19107

Attn: Mr. Robert Seybold:

Re: Vibrated Beam Slurry Wall B P Oil Co.

The field water as tested shows no adverse affects to a Bentonite Cement Water Barrier Wall. We, therefore, are confident such a wall will more than satisfy your needs.

Transmitted, herewith, is a copy of the Water Analysis and a Non Disclosure Agreement. We would like you to review and comment for signiture on both before or during our next visit.

We are presently mobilizing for two (2) jobs in our area. If you or your people are interested they would be available for inspection in the near future.

Per phone conversation of November 22, 1976, the following basic mix information is submitted.

QUANTITY: 1 m³

55 Kg Bentonite (Premium grade Wyoming)

110 Kg Cement (Type I Portland)

1.1 Kg M77 Adduct for Filtrate Loss Control

Soda Ash as required.

937 liters of H₂0 (Portable ar acceptable)

The above mix proportions will have to be modified slightly in the field to adjust for variations in Bentonite and Water Quality.

Transmitted, herewith, is one (1) copy of the Water Analysis and a typical Cement Analysis.

See your soon.

Very truly yours, SLURRY SYSTEMS SPECIALISTS, INC.

Not responsive due to revised scope

President

F-2.6

FS/rca

ALL TYPES OF SLURRY TRENCHES & WATER BARRIERS







INTERNATIONAL MINERALS & CHEMICAL CORPORATION

November 17, 1976

Slurry Systems Specialists, Inc. P. O. Box 364 East Chicago, Ind. 46312

Dear Not responsive du:

Below you will find the results so far gained on the water samples you submitted. We did not run the potable water.

Sample 1 is Surface H₂O Oct. 15/76

Sample 2 is Hook Creek prior to High Tide

Sample 3 is Svege Basin BP Oil

Sample 4 is Sub Surface Ground Water

Sample	1 .	2	3	4	
Na	3.0 ppm	3.1 ppm	372 ppm	120 ppm	
Ca	11.3 "	22.7 "	4.5 "	195 ''	
C1	not done		-	-	
K .	1.02 ppm	4.1 "	11.2 "	12.6 "	
SO ₂	not done	-	- '	-	
Oil & Grease	0 ppm	16.4 "	53 "	545 ''	

We see nothing here which would effect your type of barrier.

I am told the oil and grease are partially emulsified. It may pay for these people (if they are not already doing it) to add a "breaker" to the water. With this most of the oil and grease would be at the top and then be treatable and/removable.

If you have any questions please contact me,

Sincerely. Not responsive due to revised scope

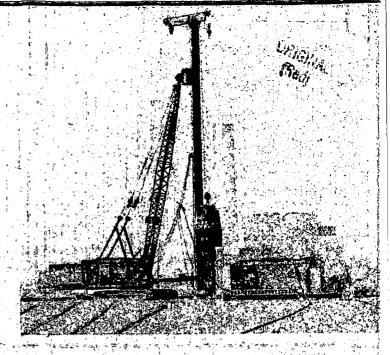
Clay Minerals Specialist

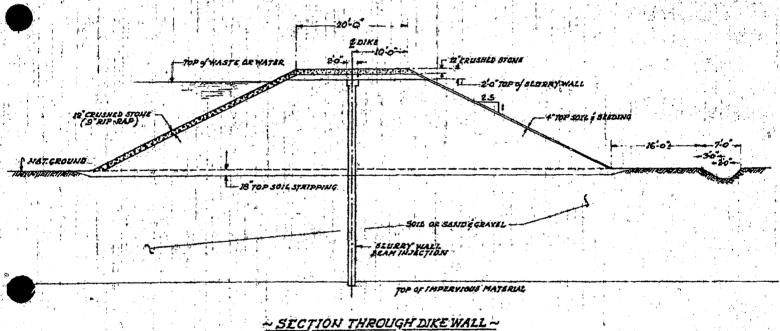
DH:kf
cc:\S

设定 区,只用区区营薪积。所以

F-2.7

First Water Cutoff Wall Injected Into US Soil On Big Power Plant Job



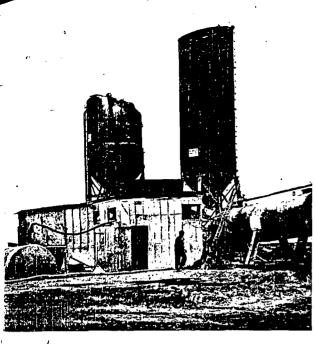




Slurry Systems Specialists, Inc. contractors & consultants

• P.O. Box 364 EAST CHICAGO, INDIANA 46312 PHONE: 219-949-0561

OCT 14 1976
MAMAGEMENT



Batch plant is a high volume production unit using jet and shearing principles. Slurry is pumped through 4 inch PVC hose up to 2200 feet to injection unit.

Largest commercial vibrator in America drives injection I-beam into ground. Slurry pipes and feed lines are mounted below vibrator.





New vibrated beam slurry system gives higher impermeability at lower cost

A revolutionary method of injecting water impermeable walls into the earth is being used for the first time in America on a new power plant in northern Indiana. The contract is being performed by Thatcher-Holzman, a joint venture, and is 90% completed with more than 24,000 lineal feet installed. Total square footage of the wall is approximately 1,100,000 with average depths of 45 feet down to a natural, impervious layer.

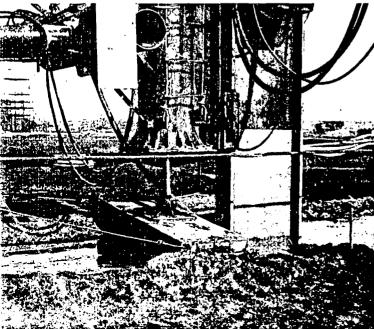
The new wall is being installed to conserve water and prevent pollution in the power plant's retention basins.

Lised successfully for more than 15 years in Europe, the vibrated beam method offers a k-value of 10-7 cm/sec compared to slurry trench method of only 10-5 cm/sec. Installation is faster with greater accuracy and far thinner walls,

with resulting savings in labor, equipment and slurry material.

More than 50,000,000 square feet of similar water cutoff walls has been installed in Europe preventing inflow or underflow on dikes, levees, dams, irrigation canals and cofferdams. Now, the geotechnical engineer in America has at his disposal a water barrier system which is efficient, superior in quality and relatively low in cost.

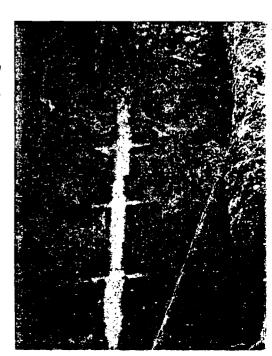
A new company, Slurry Systems Specialists Inc has been formed to install water impervious walls on any project in America. For more information about the power plant project or to find out how the new technique might work on your next project, please call or write Slurry Systems.



33-inch-wide injection beam enters ground. Lateral and vertical guides assure accurate penetration. Slurry is pumped during driving and extraction.

Excavated section of test wall after 10 months installation shows insitu condition of wall to be in perfect condition, still moist and pliable.





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